Feral pigs and the environment:
an annotated bibliography

By Trixie L. Wolf and Michael R. Conover

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Feral pigs (*Sus scrofa*) have been introduced by humans to many parts of the world where pigs did not exist historically. In areas where feral pigs are an exotic species, they are a joy to people who like to hunt them and a menace to people who are concerned about their effects on native flora and fauna. In this annotated bibliography, we examine the scientific literature to assess the impact of feral hogs on their environment. We emphasize studies conducted in areas where feral hogs are exotic species, but we have also included those conducted within their native range, along with papers dealing with the management of feral hogs.

In preparing this publication, we were faced with many situations where we had to make a decision about whether to include or exclude a particular paper from our bibliography. Our decision usually was to include the paper because we cannot tell which particular papers might be of interest to a reader. Because all papers are listed in the index by key words, there is little cost to the readers if our bibliography is exhaustive if papers can be found easily and rapidly using the index. We have, however, only provided a summary or abstract for those studies we believed to be most pertinent to the topic.

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Choquenot, D., and W. A. Ruscoe. 2003. Landscape complementation and food limitation of large herbivores: habitat-related constraints on the foraging efficiency of wild pigs. Journal of Animal Ecology 72: 14-26.

Ickes, K., S. J. Dewalt, and S. C. Thomas. 2003. Resprouting of woody saplings following stem snap by wild pigs in a Malaysian rain forest. Journal of Ecology 91: 222-233.

Keller, R. D., R. G. Litchford, J. C. Brinson, A. M., Carroll, J. M. Houck, H. F. Mauney, and M. T. McDonald. 2003. Examining boar control efforts. ArcUser January-March: 22-23.

Simberloff, D., M. A. Revla, and M. Nunez. 2003. Introduced species and management of a Nothofagus/Austrocedrus forest. Environmental Management 31: 263-275.

2002

Cuthbert, R. 2002. The role of introduced mammals and inverse density-dependent predation in the conservation of Hutton's shearwater. Biological Conservation 108: 69-79.

DeVault, T. L., and O. E. Rhodes. 2002. Identification of vertebrate scavengers of small mammal carcasses in a forested landscape. Acta Theriologica 47: 185-192.

Focardi, S., R. Isotti, E. Pelliccioni, and D. Iannuzzo. 2002. The use of distance sampling and mark-resight to estimate the local density of wildlife populations. Environmetrics 13: 177-186.

Focardi, S., R. Isotti, and A. Tinelli. 2002. Line transect estimates of ungulate populations in a Mediterranean forest. Journal of Wildlife Management 66: 48-58.

Goulding, M. J., and T. J. Roper. 2002. Press responses to the presence of free-living wild boar (*Sus scrofa*) in southern England. Mammal Review 32: 272-282.

Gresham, C. S., C. A. Gresham, M. J. Duffy, C. T. Faulkner, and S. Patton. 2002. Increased prevalence of *Brucella sius* and pseudorabies virus antibodies in adults of an isolated feral swine population in coastal South Carolina. Journal of Wildlife Diseases 38: 653-656.

Held, S., M. Mendl, C. Devereux, and R. W. Byrne. 2002. Foraging pigs alter their behavior in response to exploitation. Animal Behaviour 64: 157-165.

Animals that find food for themselves, food finders, often can be exploited by others who attempt to steal the food, exploiters. If the food finders are unable to cope with this occurrence, behavioral adaptations other than foraging can become favored. Methods of adaptation vary depending on the affected species. Primates use tactical deception while ground-feeding birds adopt a change in their periphery foraging. The authors believe pigs also may change their foraging behavior, taking on characteristics similar to that witnessed in species that are exploiters. To investigate this possibility, the authors observed the foraging strategies in exploited subordinate domestic pigs. Pairs of subordinate and dominant pigs were then selected and subjected to a foraging trial. Subordinate pigs were trained to find hidden food. When the trained subordinate pig found the hidden food, the dominant pig of the pair would steal the food. After repeated trials, logistic regression was used to analyze the data. The authors concluded that the food finders would show food directed behavior more prominently if they believed this behavior would allow them to spend more time around a food item before scroungers arrived.

Hone, J. 2002. Feral pigs in Namadgi National Park, Australia: dynamics, impacts and management. Biological Conservation 105: 231-242.

Feral pigs have become increasingly abundant in Namadgi National Park, Australia which has increased the amount of rooting and decreased plant species richness. Rooting by pigs was concentrated mainly in drainage lines and on flat land at higher elevations. Rooting occurred throughout the year, but was most severe in October and least severe in June. Prior to the implementation of a population control plan designed to reduce pig numbers, the effect of the pigs on common plants in Namadgi National Park was noticeable when the rooting became widespread. Pigs preferentially dug up the shrub *Bursaria spinosa*, the bulbrina lily (*Bulbine* sp.), the vanilla lily (*Arthropodium milleflorum),* and two orchid species (*Gastrodia* sp. and *Chiloglollis valida)*. The species density declined in areas where rooting was intensive. Rare populations of plant species were also impacted due to the incidental removal by pigs rooting for common species. In order to reduce pig rooting damage, a large reduction in pig abundance is necessary. Control of pigs was accomplished with bait stations containing warfarin poisoned grain.

Kuiters, A., and P. Slim. 2002. Regeneration of mixed deciduous forest in a Dutch forest-heathland, following a reduction of ungulate densities. Biological Conservation 105: 65-74.

In the central part of the Netherlands a study was performed to determine the impacts of ungulates on the regeneration of indigenous broadleaved tree species. Red deer, roe deer, and wild boar were thought to have a large impact on regeneration dynamics. Twenty paired plots, 10 fenced and 10 unfenced, were compared for regeneration of broadleaved trees over a 10-year period. In the fenced plots, there was an increase of tree saplings and shrubs of all types. Conversely, in the unfenced plots, where red deer, roe deer and wild boar were allowed to feed, two species of oak and silver birch were too heavily browsed to show successful regeneration under an open canopy of Scot’s pine. Because beech was less severely browsed, it was the only tree species able to regenerate in these unfenced plots. Due to the preference of browsers for oak and birch, these tree species will never become dominant in the forest canopy, but will be out-competed by beech and Scot’s pine.

Land Protection. 2002. Feral pigs in Queensland: distribution, ecology and impact. Queensland Department of Natural Resources and Mines.

Land Protection. 2002. Control of feral pigs. Queensland Department of Natural Resources and Mines.

Mayer, J. J., F. D. Martin, and I. L. Brisbin. 2002. Characteristics of wild pig farrowing nests and beds in the upper coastal plain of South Carolina. Applied Animal Behaviour Science 78: 1-17.

An introduced population of wild pigs in South Carolina built a series of farrowing nests and resting/loafing beds in which to rear their young. Thirteen farrowing nests and nine resting/loafing beds were studied. Physical description, size parameters, associated animals, and adjacent surroundings were recorded for each nest or bed. Pre-parturition sows excavated each farrowing nest, creating a depression in the ground. These nests had shapes ranging from round to oval, and they varied in size in correlation with the size of the sow that built them. Six of the nests were located beside trees, stumps, or logs, and all but one had vegetation incorporated into its structure. The materials used in nest building included a variety of plant species readily available around the nest site. Most of these plants were gathered from within 20 meters of the nest site, with younger sows gathering nesting materials very close to the site, while larger, older sows ventured much farther. These older sows also used nesting materials from younger forests more frequently than from older forests. All nests were in locations with a canopy and an open understory. The thirteen farrowing nests were compared and contrasted with the nine-resting/loafing beds. In comparison to the farrowing nests, the resting/loafing beds built by the solitary pigs were much smaller, not always excavated to create a depression in the ground, and did not always contain vegetation.

Roemer, G., J. Donlan, and F. Courchamp. 2002. Golden eagles, feral pigs, and insular carnivores: how exotic species turn native predators into prey. Proceedings of the National Academy of Sciences of the U.S.A. 99: 791-796.

Santa Cruz Island, off the coast of California, has been affected by the introduction of pigs. Native mainland golden eagles have now been able to colonize the California Channel islands due to the abundance of the feral pig as a prey species. The previous lack of an abundant prey species made it difficult for the eagles to establish colonies. Prior to the introduction of pigs, island foxes were numerous on the island. However, the eagle population could not be maintained on a prey base of island foxes alone, but had to be supplemented by another food source. The introduction of feral pigs supplemented the original prey of the eagles. Because feral pig populations can withstand predation by golden eagles, the presence of these pigs in Santa Cruz Island allowed the eagles to colonize the island. The introduction of the pigs has also changed the predatory and competitive relations between the island fox and the island spotted skunk. Since colonization of the island by golden eagles, the island fox population has decreased dramatically, and the species is now heading toward extinction. Because of a decrease in competition skunk numbers have increased as fox numbers have dropped. In summary, the introduction of feral pigs has resulted in an increase in golden eagle numbers. Subsequently, the golden eagles have had little impact on the pig population, but have reduced fox numbers to near extinction, and have indirectly caused an increase in the skunk population because of a lack of competition from foxes.

Saniga, M. 2002. Nest loss and chick mortality in capercaillie (*Tetrao urogallus*) and hazel grouse (*Bonasa bonasia*) in west Carpathians. Folia Zoologica 51: 205-214

Sicuro, F. L., and L. F. B. Oliveira. 2002. Coexistence of peccaries and feral hogs in the Brazilian Pantanal wetland: an ecomorphological view. Journal of Mammalogy 83: 207-217.

The coexistence of the white-lipped peccary, collared peccary, and feral hog is a questionable theorem. The masticatory and craniomandibular characteristics reveal important information about the competition for food between these three species. The diets of the white-lipped peccary and the collared peccary are closely associated. They are both believed to consume fruits, hard seeds, and roots as their primary diet and insects, annelids, and small vertebrates as a complimentary diet. The feral hog also eats many of these organisms; thus it is in direct competition with the peccaries. The two species of peccary have similar hinge-like jaw joints with pre and post-glenoid processes, interlocking canines that constrain lateral jaw movement, and enamel reinforcement in molar teeth. Skulls on collared peccaries are smaller than those of white-lipped peccaries, giving the white-lipped peccary the advantage of being able to bite harder and consume harder seeds. The feral hog has a bite that is at least as powerful as the white-lipped peccary, allowing it to feed on all the foods peccaries depend upon. A difference in the temporal system of the peccaries and the feral hogs also gives the feral hogs an advantage in finding food. The temporal lobe in hogs is higher than in peccaries, allowing them to root more successfully. Because white-lipped peccaries eat hard seeds or roots while collared peccaries prefer soft food items, these two species are able to coexist with minimal competition. However, the diet of feral hogs includes all of these food types, resulting in competition between the hogs and the peccaries. Ultimately, this could lead to the demise of the peccaries.

Sodeikat, G., and K. Pohlmeyer. 2002. Local movements of wild boars (*Sus scrofa*) influenced by hunting activities. Study on the ecology of a wild boar population in Lower Saxony/ Germany - preliminary results. Transactions of the Congress of the International Union of Game Biologists 24: 486-492.

Sweitzer, R. A., and D. H. Van Vuren. 2002. Rooting and foraging effects of wild pigs on tree regeneration and acorn survival in California's oak woodland ecosystem. USDA Forest Service Gen. Tech. Rep. PSW-GTR-184.

Virgos, E. 2002. Factors affecting wild boar (*Sus scrofa*) occurrence in highly fragmented Mediterranean landscapes. Canadian Journal of Zoology 80: 430-435.

Two hypotheses were tested in an attempt to discover the affects of forest fragmentation on populations of wild boars. The hypotheses were 1) that the wild boar would behave like other generalist species with high reproductive potential, broad food selection, and habitat generalization, and 2) that the landscape pattern would determine the response of the wild boar to forest fragmentation, with boar numbers being higher in large and juxtaposed patches than in small and distant patches. Four areas of study were chosen meeting 4 criteria. The criteria were 1) no more than 20 percent forest cover at the regional level, 2) a certain degree of usefulness in the gradient of fragment sizes, 3) greater than 25 meters separation between forest fragments, and 4) dominance of holm oak in the fragment. To estimate boar population size in a forest fragment, the number of scrapes in that fragment were observed and recorded. Sampling of vegetation structure was also included on the trails where scrapes were observed to determine if the vegetation affected the boar population. The results indicated boars preferred larger forest areas near mountains or large riparian woodlands, offering them a variety of vegetation. Boars were more heavily concentrated in areas that had remained relatively unchanged by humans, indicating that agricultural landscapes may impede the boar's ability to disperse to different forest fragments.

Volokh, A. M. 2002. Some ecological characteristics of southern marginal wild boar population in Ukraine. Zoologichesky Zhurnal 81:1506-1512.

2001

Dickson, J. G., J. J. Mayer, and J. J. Dickson. 2001. Wild hogs. Pages 191-193, 201- 208 *in* J. G. Dickson, editor. Wildlife of Southern Forests: habitat and management. Hancock House Publishers, Blaine, Washington.

Engeman, R. M., B. Constantin, M. Nelson, J. Woolard, and J. Bourassa. 2001. Monitoring changes in feral swine abundance and spatial distribution. Environmental Conservation 28: 235-240.

There is a great need in wildlife management for a way to index populations of feral swine. Knowledge of abundance and distribution is valuable for many management operations. This study was conducted in Florida in an area that is home to a variety of threatened plants and animals. Swine are controlled in the area to reduce and control their negative impacts. A major deficiency at the moment is an inability to measure abundance. A passive tracking index, originally used to measure coyote abundance, was used to accurately estimate the abundance of feral swine. The tracking index is a useful means for assessing the changes in the feral pig population, and also provides information on population distribution.

Fisher, K. 2001. Plight of the island fox. Outdoor California 62: 36-38.

California's Channel Islands are home to a population of island foxes that are declining due to the presence of feral pigs. Heavy grazing and rooting by pigs and other introduced herbivores have changed the type of vegetation in the area and increased erosion, decreasing of usable habitat for foxes. Previously, the fox was the top carnivore on the islands and was not threatened by other animals. In addition, golden eagles failed to colonize the islands because of a scarce food supply and the presence of bald eagles. However, due to the introduction of feral hogs and the removal of bald eagles through DDT poisoning, shooting, and other disturbances, the golden eagle has successfully colonized the islands. This colonization was facilitated by the introduction of a large prey base consisting of piglets. Along with piglets, the eagles prey on the island foxes.

This predation has seriously decreased the number of foxes. As long as feral pigs remain on the islands, the eagles will continue to migrate from the mainland. Thus, the removal of pigs is a priority.

Focardi, S., A. M. De Marinis, M. Rizzotto, and A. Pucci. 2001. Comparative evaluation of thermal imaging and spotlighting to survey wildlife. Wildlife Society Bulletin 29: 133-139.

Gabor, T., E. Hellgren, and N. Silvy. 2001. Multi-scale habitat partitioning in sympatric suiforms. Journal of Wildlife Management 65: 99-110.

This study dealt with the interaction between native collared peccaries (*Tayassn tajacu*) and introduced feral pigs (*Sus scrofa*) inhabiting the same area in southern Texas. From 1993-1995 these species were observed in 3 scales of resource partitioning. These scales were 1) seasonal home range, 2) microhabitat, and 3) temporal microhabitat. Multi-scale partitioning may provide additive and multiplicative habitat partitioning between these species and allow coexistence, even during harsh environmental conditions such as drought.

Gazdag, F. 2001. Data on the effect of wild boar on pheasants. Vadbiologia 8: 59-62.

Ickes, K. 2001. Hyper-abundance of native wild pigs (*Sus scrofa*) in a lowland dipterocarp rain forest of peninsular Malaysia. Biotropica 33: 682-690.

This study reports high density estimates for wild pigs (*Sus scrofa*) for a seasonal tropical forest site within the species native range. The site was Pasoh Forest Reserve, a 2500 ha area of lowland dipterocarp rainforest in Peninsular Malaysia. Line transects were used to estimate pig densities from May to October in 1996 and 1998. In 1996, 44 sightings found 166 individuals along 81 km of transects. In 1998, 39 sightings found 129 individuals along 79.9 km of transects. The estimated population densities were 47pigs/km^2 in 1996 and 27 pigs/km^2 in 1998. The differences in densities between years coincided with a high abundance of dipterocarp seeds in 1996. Overall, the densities of pigs at the Pasoh Forest Reserve were much higher than the densities in other European and Asian forests in the pig's native range. Two possible factors could increase the number of pigs in the forest: 1) the extinction of natural predators such as tigers and leopards; and 2) use of the abundant African oil palm fruit from bordering plantations as a food supply.

Ickes, K., S. Dewalt, and S. Appanah. 2001. Effects of native pigs (*Sus scrofa*) on woody understory vegetation in a Malaysian lowland rain forest. Journal of Tropical Ecology 17: 191-206.

This study examined the extent that native wild pigs influence the dynamics of tree seedlings and saplings in West Malaysia by comparing the plant communities inside pig exclosures to control areas. After 2 years, tree seedlings were 3 times greater in the exclosures than in the unfenced control areas. Soil rooting and seed predation significantly influenced species richness, growth, and survival of woody plants in the understory. Measurements from Pasoh Forest Reserve indicate that the pigs are having a considerable impact on understory vegetation dynamics.

McIlroy, J. C. 2001. Advances in New Zealand mammalogy 1990-2000: feral pig. Journal of the Royal Society of New Zealand 31: 225-231.

Meriggi, A., and O. Sacchi. 2001. Habitat requirements of wild boars in the northern Apennines (N Italy): a multi-level approach. Italian Journal of Zoology 68: 47.

Peters, H. A. 2001. *Clidemia hirta* invasion at the Pasoh Forest Reserve: an unexpected plant invasion in an undisturbed tropical forest. Biotropica 33: 60-68.

Pimentel, D., S. McNair, J. Janecka, J. Wightman, C. Simmonds, C. O'Connell, E. Wong, L. Russel, J. Zern, T. Aquino, and T. Tsomondo. 2001. Economic and environmental threats of alien plant, animal, and microbe invasions. Agriculture Ecosystems & Environment 84: 1-20.

Roemer, G. W., T. J. Coonan, D. K. Garcelon, J. Bascompte, and L. Laughrin. 2001. Feral pigs facilitate hyperpredation by golden eagles and indirectly cause the decline of the island fox. Animal Conservation 4: 307-318.

Rollins, D., and J. Carroll. 2001. Impacts of predation on northern bobwhite and scaled quail. Wildlife Society Bulletin 29: 39-51.

Depredation by coyotes, snakes, skunks and feral hogs has been cited as a major cause of nest failure in scaled quail. In this study, feral hogs were implicated in the loss of simulated nests in two counties in Texas. This loss is important to wildlife managers because the distribution and abundance of feral hogs has increased in the Southeast United States and Texas. However, the impact of feral swine depredation is still unclear due to the abundance of hogs in areas that support the largest quail populations.

Sierra, C. 2001. The feral pig (*Sus scrofa*, Suidae) in Cocos Island, Costa Rica: composition of its diet, reproductive state and genetics. Revista de Biologia Tropical 49: 1147-1157.

Sierra, C. 2001. The feral pig (*Sus scrofa,* Suidae) in Cocos Island, Costa Rica: rootings, soil alterations and erosion. Revista de Biologia Tropical 49:1159-1170.

van Riper, C., and J. Scott. 2001. Limiting factors affecting Hawaiian native birds. Studies in Avian Biology 22: 221-233.

Van Wieren, S. E., and P. B. Worm. 2001. The use of motorway wildlife overpass by large mammals. Netherlands Journal of Zoology 51: 97-105.

2000

Fernandez-Llario, P., and J. Carranza. 2000. Reproductive performance of the wild boar in a Mediterranean ecosystem under drought conditions. Ethology Ecology and Evolution 12:

335-343.

Fleming, P. J. S., D. Choquenot, and R. J. Mason. 2000. Aerial baiting of feral pigs (*Sus scrofa)* for the control of exotic disease in the semi-arid rangelands of New South Wales. Wildlife Research 27: 531-537.

Focardi, S., D. Capizzi, and D. Monetti. 2000. Competition for acorns among wild boar (*Sus scrofa*) and small mammals in a Mediterranean woodland. Journal of Zoology 250: 329-334.

The wild boar partly compensates for a reduced availability of above ground acorns in the spring by predating on hoards collected in the winter by small mammals. The availability of acorns in the spring is critical to female boars because they need the extra nutrition for lactation. In the spring, wild boars actively search for buried acorns, excavating the acorns they find by rooting. When acorns are found, locations with burrows are excavated significantly more than those without burrows. This behavior may influence the population dynamics of boars and small mammals. Although the amount of roots eaten was low, deep rooting remained high in February and March as boars excavated burrows containing cached acorns. The cues wild boars use to locate underground acorns are not known, but it is clear that the number of acorns in a burrow does not influence the probability of rooting. One possible explanation is that wild boars use the presence of burrow holes to find hoards of acorns. This explanation seems reasonable due to the lack of small mammals in the diet of wild boars, suggesting that they root to find acorns and not small mammals.

Gabor, T., and E. Hellgren. 2000. Variation in peccary populations: landscape composition or competition by an invader? Ecology 81: 2509-2524.

Groot-Bruinderink, G. W. T. A., D. R. Lammertsma, and E. Hazebroek. 2000. Effects of cessation of supplemental feeding on mineral status of red deer *Cervus elephus* and wild boar *Sus scrofa* in the Netherlands. Acta Theriologica 45: 71-85.

Heise-Pavlov, P. 2000. Wild (feral) pigs in Australia-origin, distribution, ecology and damage. Beitraege zur Jagd-und Wildforschung 25: 137-142.

Jones, J. B., C. M. Wathes, R. P. White, and R. B. Jones. 2000. Do pigs find a familiar odourant attractive in novel surroundings? Applied Animal Behaviour Science 70: 115-126.

Kavanaugh, D., and S. Linhart. 2000. A modified bait for oral delivery of biological agents to raccoons and feral swine. Journal of Wildlife Diseases 36: 86-91.

Koritin, N., V. Bolshakov, N. Markov, and N. Pogodin. 2000. The effect of hunting on sex ratio in populations of ungulates in middle Urals. Beitraege zur Jagd-und Wildforschung 25: 49-61.

Mayer, J. J., E. A. Nelson, and L. D. Wike. 2000. Selective depredation of planted hardwood seedlings by wild pigs in a wetland restoration area. Ecological Engineering 15: S79-S85.

Several thousand hardwood seedlings were planted in a wetland restoration area as part of a mitigation effort to restore a bottomland hardwood community. The area was pretreated with herbicide and a controlled burn. Damage was assessed on foot after the rooting of the pigs was discovered. Four of the nine species of hardwood seedlings were affected by the pigs, while the remaining five were unaffected. The pretreatment procedures may have influenced the pigs ability to find particular areas, or other factors associated with odor and taste may have been influential resulting in the selective depredation. Removal of pigs from adjacent areas before treatment could resolve the problem of depredation when replanting an area.

Nores, C., A. Fernandez Gil, and N. Corral. 2000. Estimating wild boar (*Sus scrofa*) population by counting family herds. Naturalia Cantabricae 1: 53-59.

Rosenfeld, A. 2000. Wild boar habitat preference: a case of human influence. Israel Journal of Zoology 46: 171.

Saunders, G. 2000. The principles and application of effective pest animal management-feral pigs. NSW Agriculture and Bureau of Rural Publication CD-ROM.

Sweitzer, R., D. Van Vuren, I. Gardner, W. Boyce, and J. Waithman. 2000. Estimating sizes of wild pig populations in the north and central coast regions of California. Journal of Wildlife Management 64: 531-543.

This study used the mark-sighting approach to estimate densities of wild hogs in the north and central coast regions of California in 1994 and 1995. During this study, hogs were captured, marked, and released. Later, hogs were sighted with an automatic camera, and the number of marked hogs sighted was recorded. Eighty and 149 pigs were captured, tagged, and released respectively. Of the 249 hogs marked, 202 (88%) were sited by the camera. The mark-sighting data was analyzed with the NOREMARK program to estimate the population size maintaining a 95% confidence interval. The mean population density in the area ranged from 0.7 to 3.8 wild hogs /km^2, and densities increased between 1994 to 1995. This study also found that wild hog densities were lower in areas open to hunting, which suggests that sport hunting may be effective at reducing pig numbers.

Van Wieren, S. E. 2000. Digestibility and voluntary intake of roughages by wild boar and Meishan pigs. Animal Science 71: 149-156.

Digestibility and voluntary intake of fibrous roughages and acorns was studied in six wild boars and five Meishan pigs. Organic matter digestibility of acorns, mixed grass and wheat straw was higher in the wild boar, while the diet of the Meishan pig was highest in mixed grass hay and wheat straw. No relationship existed between voluntary food intake and neutral detergent fiber concentration. The author concluded that wild boars and domestic pigs should be able to maintain themselves on a diet consisting of all fresh grass as long as the neutral detergent fiber concentration of the diet does not exceed about 55g/kg, and the N concentration is adequate.

Welander J. 2000. Spatial and temporal dynamics of a disturbance regime. Wild boar, *Sus scrofa,* rooting and its effects on plant species diversity. Acta Universitatis Agriculturae Sueciae - Silvestria 127, Papers 1-4.

Welander, J. 2000. Spatial and temporal dynamics of wild boar (*Sus scrofa*) rooting in a mosaic landscape. Journal of Zoology 252: 263-271.

Rooting by wild boars in Sweden was studied in an attempt to determine the intensity and impact of rooting between habitats as well as seasonal differences in rooting patterns. The areas being rooted were categorized by habitat type, soil category, and year. The largest rooted patches were found in deciduous forests and areas containing damp soils, while the smallest were in grasslands and areas with dry soils. Most rooting occurs from mid-autumn to early spring, but rooting decreases when new shoots from herbs become available later in spring. Rooting intensity varies annually, depending on the abundance and availability of preferred foods, which results in yearly variations in soil disturbance by wild boars.

1999

Arrington, D., L. Toth, and J. Koebel Jr. 1999. Effects of rooting by feral hogs *Sus scrofa* L. on the structure of a flood plain vegetation assemblage. Wetlands 19: 535-544.

Feral hogs can be a source of significant wetland disturbance during dry portions of the hydrologic cycle. In this study, fenced exclosures were used to evaluate the effects of hog rooting on total plant cover, plant-defined microhabitat diversity, and species richness within the Kissimmee River floodplain. After being subjected to rooting, there was a significant increase in the diversity of species in the unfenced control plots. Rooting changes soil characteristics by allowing soil to become oxidized through exposure, changing the topography of the soil, and changing the moisture characteristics of the soil. Hog rooting can also lead to open areas that can be colonized by various avian and fish species when the marsh floods again. Thus, the disturbance created by hog rooting enhances the diversity of wetland plant assemblages in the Kissimmee River floodplain.

Carretero, M., and C. Rosell. 1999. *Salamandra salamandra* (fire salamander). Predation. Herpetological Review 30: 161.

Choquenot, D., J. Hone, and G. Saunders. 1999. Using aspects of predator–prey theory to evaluate helicopter shooting for feral pig control. Wildlife Research 26: 251-261.

Dexter, N. 1999. The influence of pasture distribution, temperature and sex on home-range size of feral pigs in a semi-arid environment. Wildlife Research 26: 755-762.

Eason, C., L. Milne, M. Potts, G. Morriss, G. Wright, and O. Sutherland. 1999. Secondary and tertiary poisoning risks associated with brodifacoum. New Zealand Journal of Ecology 23: 219-224.

Fernandez-Llario, P., J. Carranza, and P. Mateos-Quesada. 1999. Sex allocation in a polygynous mammal with large litters: the wild boar. Animal Behavior 58: 1079-1084.

Gabor, T., E. Hellgren, R. Van Den Bussche, and N. Silvy. 1999. Demography, sociospatial behaviour and genetics of feral pigs (*Sus scrofa*) in a semi-arid environment. Journal of Zoology 247: 311-322.

Gustafsson, M., P. Jensen, F. de-Jonge, and T. Schuurman. 1999. Domestication effects on foraging strategies in pigs (*Sus scrofa*). Applied Animal Behaviour Science 62: 305-317.

Jamnicky, J. 1999. Hunting of wild boar in Slovakia one hundred years ago. Folia Venatoria 28/29: 191-196.

Jayson, E., and S. Sridhara, editors. 1999. Habitat use of herbivores in the Chimmony Wildlife Sanctuary, Kerala, India. Advances in Ethology 34: 127.

Kruger, T., and S. Herzog. 1999. Economic incentives as a management goal of wild boar (*Sus scrofa)* populations, using the hunting administration of the Freistaat Sachsen (Saxony) as an example. Zeitschrift fur Jagdwissenschaft 45: 196-207.

Leaper, R., G. Massei, M. L. Gorman, and R. Aspinall. 1999. The feasibility of reintroducing wild boar (*Sus scrofa*) to Scotland. Mammal Review 29: 239-259.

Manlius, N., and A. Gautier. 1999. The wild boar in Egypt. Comptes Rendus de l'academie des Sciences Serie III-Sciences de la vie-Life Sciences 322: 573-577.

Mason, R., and P. Fleming. 1999. Australian hunters and the surveillance of feral pigs for exotic diseases. Wildlife Society Bulletin 27: 395-402.

Nemtzov, S. 1999. The use of animal repellents and conditioned-taste aversion to reduce wildlife damage to agricultural products. Israel Journal of Zoology 45: 317.

Perry, G., and J. Morton. 1999. Regeneration rates of the woody vegetation of Guam's Northwest Field following major disturbance: land use patterns, feral ungulates, and cascading effects of the brown tree snake. Micronesica 32: 125-142.

Saunders, G., and S. McLeod. 1999. Predicting home range size from the body mass or population densities of feral pigs, *Sus scrofa* (Artiodactyla: Suidae). Australian Journal of Ecology 24: 538-543.

Spitz, F., and S. Lek. 1999. Environmental impact prediction using neural network modeling. An example in wildlife damage. Journal of Applied Ecology 36: 317-326.

Statistical models can be used to predict the outcomes of management decisions. Conventional methods assume that factors are linear, but this is not the case in most wildlife damage situations. The Artificial Neural Network (ANN) model is suggested for use in such cases. With ANN models the predictive value is 82% with a deviation of 10% from the range of observed models. ANN models are used in France to predict the damage caused by deer and wild boars on certain agricultural plots. Based on these models, managers can decide how much protection a plot needs. In this study, damage costs were negatively correlated with the proximity of roads, the proximity of houses, and the number of houses in the vicinity of sites studied. A positive relationship was observed between damage costs and both the degree of enclosure in the area and the density of surrounding vegetation. Wild boar density was found to have a linear relationship with damage costs.

Waithman, J., R. Sweitzer, D. Van Vuren, J. Drew, A. Brinkhaus, I. Gardner, and W. Boyce. 1999. Range expansion, population sizes, and management of wild pigs in California. Journal of Wildlife Management 63: 298-308.

1998

Ashby, K., and C. Santiapillai. 1998. The life expectancy of the wild pig *Sus scrofa* L. in Ruhuna National Park, Sri Lanka. Bombay Natural History Society Journal 95: 33-42.

Baubet, E., S. Brandt, and C. Touzeau. 1998. Effect of hunting on the strategies of space use by the wild boar. Preliminary analysis. Gibier Faune Sauvage 15: 655-658.

Blant, M. 1998. Creation d'une nouvelle voie de deplacement pour le gibier a travers une plaine agricole. Gibier Faune Sauvage 15: 843-848.

Choquenot, D. 1998. Testing the relative influence of intrinsic and extrinsic variation in food availability on feral pig populations in Australia's rangelands. Journal of Animal Ecology 67: 887-907.

Fernandez-Llario, P., and P. Mateos-Quesada. 1998. Body size and reproductive parameters in the wild boar *Sus scrofa*. Acta Theriologica 43: 439-444.

Ford, M., and J. Grace. 1998. Effects of vertebrate herbivores on soil processes, plant biomass, litter accumulation and soil elevation changes in a coastal marsh. Journal of Ecology 86: 974-982.

Herbivores can reduce below-ground plant production and expansion of the root zone. In areas where sediment deposits are low, herbivores may destroy habitat in coastal marshes. Sediment deposits may be able to offset the effects of grazing by herbivores when rates of sediment deposits are high, but herbivores can contribute to the loss of wetlands when the sediment deposit rates are too low. This study investigated the effects of habitat use by wild boars and other herbivores on a coastal marsh. Wild boars were present in large numbers and used patches within their larger range. The patchiness of their habitat use created "eat outs" in patches where most of the above-ground biomass was removed. The below-ground biomass was also significantly reduced by grazing. The results from this study indicate that herbivores can have a substantial negative effect on the soil building process.

Frederick, J. 1998. Overview of wild pig damage in California. Vertebrate Pest Conference 18: 82-86.

Populations of wild pigs are present in 45 of California's 58 counties. The presence of these populations is a concern because wild pigs can cause significant damage to rangelands, farms, livestock and natural resources. Rooting by pigs in search of roots, fungus, insects and grubs can result in destruction of crops. Rooting also damages irrigation systems, ponds, and native vegetation. Wild pigs also will attack, kill, and totally consume lambs and calves, leaving no evidence of the attack. A survey was sent to all County Agricultural Commissioners in California in order to collect data on damage caused by wild pigs. The 40 counties that responded to the survey reported damages totaling $1,731,920. Rooting was reported as the major cause of damage followed by the consumption of crops.

Geisser, H. 1998. The wild boar (*Sus scrofa*) in the Thurgau (Northeastern Switzerland): population status, damages and the influence of supplementary feeding on damage frequency. Gibier Faune Sauvage 15: 547-554.

Gipson, P., B. Hlavachick, and T. Berger. 1998. Range expansion by wild hogs across the central United States. Wildlife Society Bulletin 26: 279-286.

This paper summarizes the current range of wild boars, current trends in their expansion and introduction into new areas, and the negative impacts resulting from their presence. Expansion into new areas can result from transport for hunting, escape from confined facilities used for hunting, dispersal of wild populations, and escape of domestic swine from free ranging commercial ranches. Presently, wild hogs are rapidly expanding their range northward. This expansion into new areas can have a negative impact on native communities. The negative impacts of expanding wild hogs on native communities include competition with native animals for food, soil erosion, modification of habitat, predation on the young and nests of ground birds, predation on small vertebrates, and crop damage. Wild hogs also can act as reservoirs for diseases that can be vectored to native wildlife or domestic hogs. These problems are exacerbated by the fact that eradication efforts are costly and not always successful once a population is established, which can increase the difficulty encountered by managers trying to solve hog damage problems.

Hahn, N., and D. Eisfeld. 1998. Diet and habitat use of wild boar (*Sus scrofa*) in SW-Germany. Gibier Faune Sauvage 15: 595-606.

Kanzaki, N., K. Perzanowski, and M. Nowosad. 1998. Factors affecting wild boar (*Sus scrofa*) population dynamics in Bieszczady, Poland. Gibier Faune Sauvage 15: 1171-1178.

Massei, G., P. Bacon, and P. Genov. 1998. Fallow deer and wild boar pellet group disappearance in a Mediterranean area. Journal of Wildlife Management 62: 1086-1094.

Mitchell, J. 1998. The effectiveness of aerial baiting for control of feral pigs (*Sus scrofa)* in North Queensland. Wildlife Research 25: 297-303.

Sekhar, N. U. 1998. Crop and livestock depredation caused by wild animals in protected areas: the case of Sariska Tiger Reserve, Rajasthan, India. Environmental Conservation 25: 160-171.

A survey and assessment of crop damage was conducted in villages in and around the Sariska Tiger Reserve, Rajasthan, India. Nilgai and wild boar were reported to be responsible for half of the total crop damage caused by animals. Populations of nilgai and wild boar in the area increased after a ban on hunting, and this population increase was correlated with an increase in crop damage. Together, these two species accounted for 60% of the crop damage in the area. Although both species caused considerable damage, wild boar damage to corn, wheat and gram was greater than that caused by nilgai. From this survey and assessment, it was determined that wild boar were feeding nocturnally on crops in the mid to late growth phases. Crop losses were more severe in the areas near the reserve than they were farther from the reserve.

Singhal, N., and A. Mukhopadhyay. 1998. The first population estimate of some herbivores in Garumara National Park, West Bengal. Indian Forester 124: 814-818.

Sweitzer, R. 1998. Conservation implications of feral pigs in island and mainland ecosystems, and a case study of feral pig expansion in California. Vertebrate Pest Conference 18: 26-34.

Taylor, R., E. Hellgren, T. Gabor, and L. Ilse. 1998. Reproduction of feral pigs in southern Texas. Journal of Mammalogy 79: 1325-1331.

Feral pigs are known to have high reproductive rates. This study investigated reproduction of feral pigs in south Texas. Three age categories were important in this study: 1) juveniles less than 12 months old, 2) yearlings 12-21 months of age, and 3) adults over 21 months of age. Ovulation was detected in all age categories, but yearlings were less likely to have ovulated. Litter sizes in this study ranged from 4.8 to 7.5 young per liter, with two instances of 2 litters in one year. It was found that the average litter size did not vary by age, but that the overall reproductive success of adult pigs was higher. Litter size was also larger in Eurasian boars, with a male biased sex ratio that was not statistically significant unless the two study populations were combined. Breeding in this area took place in autumn, early winter and spring. Because of the high reproductive rates of wild hogs, these hog populations could affect the community structure of native ungulates. This effect has been shown in other studies where pig to peccary densities have been inversely related even though their diets do not overlap substantially.

Updike, D. 1998. Changes in wild pig depredation in California: a new law. Vertebrate Pest Conference 18: 87-89.

Woelfel, H., and H. Reinecke. 1998. General reflections on and practical experiences with species-adapted hunting methods. Gibier Faune Sauvage 15: 1081-1091.

Wong, T., N. Sodhi, and I. Turner. 1998. Artificial nest and seed predation experiments in tropical lowland rainforest remnants of Singapore. Biological Conservation 85: 97-104.

This study investigates predation rates relative to the edge of a fragment of habitat. Predation events were categorized as being committed by birds or mammals, but not specific species. It says that wild pigs are potential nest and/or seed predators and were observed at the various sites.

1997

Artois, M. 1997. Managing problem wildlife in the 'Old World': a veterinary perspective. Reproduction, Fertility and Development 9: 17-25.

Baubet, E., C. Touzeau, and S. Brandt. 1997. Earthworms in the wild boar diet (*Sus scrofa)* in mountain pasture. Mammalia 61: 371-383.

Caley, P. 1997. Movements, activity patterns and habitat use of feral pigs (*Sus scrofa)* in tropical habitat. Wildlife Research 24: 77-87.

Catsadorakis, G., and M. Malakou. 1997. Conservation and management issues of Prespa National Park. Hydrobiologia 351: 175-196.

Choquenot, D., B. Lukins, and G. Curran. 1997. Assessing lamb predation by feral pigs in Australia's semi-arid rangelands. Journal of Applied Ecology 34: 1445-1454.

This study assessed predation by feral pigs in the semi-arid rangelands of eastern Australia. In this study, lambs chased by pigs were never caught if the distance the pigs had to run was more than 40m or the duration of the attack was longer than 10 seconds. Thus, the size and strength of the lamb determined its ability to evade capture by a pig. Twin lambs are smaller and weaker than single lambs, making them easier for pigs to capture. Twin lambs in this study were 5-6 times more likely to be preyed upon by pigs than single lambs. Thus, identification of twin bearing ewes and intensive management during the lambing season may negate much of the effects that feral pigs have on lamb production. The overall trend showed that as pig density increased, lamb predation increased until the pig density reached a saturation point. After reaching this saturation point, competition among pigs caused a decrease in pig numbers that resulted in a decrease in predation on lambs.

Gabor, T. M., E. C. Hellgren, and N. J. Silvy. 1997. Immobilization of collared peccaries (*Tayassu tajacu)* and feral hogs (*Sus scrofa*) with Telazol ® and xylazine. Journal of Wildlife Diseases 33: 161-164.

Glowacinski, Z., and P. Profus. 1997. Potential impact of wolves *Canis lupus* on prey populations in eastern Poland. Biological Conservation 80: 99-106.

Hahn, N., and D. Eisfeld. 1997. Diet and habitat use of wild boar (*Sus scrofa*) in SW-(southwest) Germany. Gibier Faune Sauvage 15: 595-606.

Klotz, S., S. J. Milton, and W. R. J. Dean. 1997. Effects of small scale animal disturbances on plant assemblages of set-aside land in central Germany. Journal of Vegetation Science 8: 45.

Likhatskii, Y., N. Nikitin, and A. Trubnikov. 1997. Snow cover of island forests of the central Chernozem zone and its impact on the spatial structure of the community of ungulates. Russian Journal of Ecology 28: 96-101.

Maguire, L., P. Jenkins, and G. Nugent. 1997. Research as a route to consensus? Feral ungulate control in Hawaii. North American Wildlife and Natural Resources Conference 62: 135-145.

Introduced ungulate species have destroyed Hawaii's native flora and fauna through competition and predation. Among these introduced ungulates is the feral pig. There are many techniques used to control feral pig populations in Hawaii. Neck snares are often used in areas that are remote and not easily accessible. Agencies that use this form of control have come under scrutiny from animal rights groups that allege that this method is inhumane and that snared pigs may die slowly and painfully due to the remote location. As a result of this scrutiny, a workshop was held in an attempt to analyze different control methods. This workshop resulted in the development of short- and long-term research agendas designed to investigate the feasibility of alternative methods of capture and control of feral pigs.

Markov, N. 1997. Population dynamics of wild boar, *Sus scrofa*, in Sverdlovsk oblast and its relation to climatic factors. Russian Journal of Ecology 28: 269-274.

Martinoli, A., A. Zilio, M. Cantini, G. Ferrario, and M. Schillaci. 1997. Distribution and biometry of the wild boar (*Sus scrofa*) in the Como and Varese provinces. Hystrix 9: 79-83.

Massei, G., and P. Genov. 1997. Factors influencing home range and activity of wild boar (*Sus scrofa*) in a Mediterranean coastal area. Journal of Zoology 242: 411-423.

Massei, G., P. Genov, B. Staines, and M. Gorman. 1997. Mortality of wild boar, *Sus scrofa*, in a Mediterranean area in relation to sex and age. Journal of Zoology 242: 394-400.

McIlroy, J. C. 1997. The 'Judas' pig technique: a method that could enhance control programmes against feral pigs, *Sus scrofa*. Wildlife Research 24:483-491.

MickLich, D., H. D. Matthes, and H. Mohring. 1997. The use of pigs in the countryside care and their effects on the natural succession. Proceedings of the First International Symposium on Physiology and Ethology of Wild and Zoo Animals 2: 155-159.

Milton, S. J., W. R. J. Dean, and S. Klotz. 1997. Effects of small-scale animal disturbances on plant assemblages of set-aside land in central Germany. Journal of Vegetation Science 8: 45-54.

Ruhe, F. 1997. On the construction of resting places among wild boar (*Sus scrofa)* during a period of severe frost. Zeitschrift fur Jagdwissenschaft 43: 116-119.

Russo, L., G. Massei, and P. Genov. 1997. Daily home range and activity of wild boar in a Mediterranean area free from hunting. Ethology 9: 287-294.

Sweitzer, R., B. Gonzales, I. Gardner, D. Van Vuren, J. Waithman, and W. Boyce. 1997. A modified panel trap and immobilization technique for capturing multiple wild pigs. Wildlife Society Bulletin 25: 699-705.

Taylor, R., and E. Hellgren. 1997. Diet of feral hogs in the western South Texas Plains. Southwestern Naturalist 42: 33-39.

The diets of the feral hogs in Texas are similar to the diets of hogs in other semi-arid areas. This study investigated the diets of feral hogs in the western South Texas Plains, and the effect of these hogs on several threatened species. As a result of the variation in food sources among seasons, the diet of hogs on the study site varied throughout the year. During spring and summer, their diet consisted mainly of vegetation, while acorns were their main winter food source. Their fall diet was composed of roots and corn. Animal matter consisting of deer, mourning doves, reptiles, and other birds represented a small portion of the hogs' diet. Of these, reptiles were the most susceptible to predation. There was competition between deer and hogs during low mast years, and hogs were observed excluding deer from eating acorns. Competition may impact the deer population in the area. The authors did not investigate feral hog impacts to the plant community.

Waithman, J. 1997. Hunting guide for wild pigs in California. California Department of Fish and Game, Sacramento, California.

Warren, R., and C. Ford. 1997. Diets, nutrition, and reproduction of feral hogs on Cumberland Island, Georgia. Southeastern Association of Fish and Wildlife Agencies 51: 285-296.

1996

Banaszak, J., T. Cierzniak, S. Kaczmarek, T. Manole, B. Pilacinska, H. Ratynska, W. Szwed, and H. Wisniewski. 1996. Biodiversity of forest islands in an agricultural landscape. Polish Academy of Sciences Bulletin. Biological Sciences 44: 111-119.

Berger, F., B. Darchen, et al. 1996. Les fruits forestiers dans la nourriture automnale du sanglier en Pays Lindois. Office National de la Chasse - Bulletin Mensuel 207: 14-21.

Bialy, K. 1996. The effect of boar (*Sus scrofa*) rooting on the distribution of organic matter in soil profiles and the development of wood anemone (*Anemone nemorosa* L.) in the oak-hornbeam stand (Tilio-Carpinetum) in the Bialowieza Primeval Forest. Folia Forestalia Polonica 38: 77-88.

Choquenot, D., and N. Dexter. 1996. Spatial variation in food limitation: the effects of foraging constraints on the distribution and abundance of feral pigs in Australia's rangelands. Pages 27-42 *in* R. B. Floyd, A. W. Sheppard, and P. J. DeBarro, editors. Frontiers of population ecology. CSIRO Publishing, Melbourne, Australia

Choquenot, D., and B. Lukins. 1996. The effect of pasture availability on bait uptake by feral pigs in Australia's semi-arid rangelands. Wildlife Research 23: 421-428.

Choquenot, D., J. McIlroy, and T. Korn. 1996. Managing Vertebrate Pests: feral pigs. Bureau of Resource Sciences. Canberra, Australia.

Daskalova, A., and Y. Tzvetkov. 1996. Relationship between the health status and ecological environment in wild mammals. Transactions of the Congress of the International Union of Game Biologists 22: 408-413.

Dexter, N. 1996. The effect of an intensive shooting exercise from a helicopter on the behaviour of surviving feral pigs. Wildlife Research 23: 435-441.

Fernandez-Llario, P., J. Carranza, and S. Hidalgo-de-Trucios. 1996. Social organization of the wild boar (*Sus scrofa*) in Donana National Park. Miscellania Zoologica 19: 9-18.

Focardi, S., S. Toso, and E. Pecchioli. 1996. The population modeling of fallow deer and wild boar in a Mediterranean ecosystem. Forest Ecology and Management 88: 7-14.

Groot-Bruinderink, G. W. T. A., and E. Hazebroek. 1996. Wild boar (*Sus scrofa scrofa* L.) rooting and forest regeneration on podzolic soils in the Netherlands. Forest Ecology and Management 88: 71-80.

The effects of rooting by wild boars on soil chemistry and forest regeneration was studied in deciduous and coniferous forests growing in podzolic soils in the Netherlands. Mast availability increased rooting activities in winter and negatively affected trees. Rooting intensity was always highest in deciduous forests, and juvenile plant mortality was high in some areas due to mechanical damage and uprooting. However, juvenile plant mortality may be counteracted by improved germination and growth conditions. For most trees rooting by feral pigs has no impact on their ability to regenerate. Rooting was intense enough to reduce regeneration in 3 oak species *Quercus robur, Q. petraea, Q. rubra* and beech (*Fagus sylvestris*).

Haskell, M. J., E. M. C. Terlouw, A. B. Lawrence, and H. W. Erhard. 1996. The relationship between food consumption and persistence of post-feeding foraging behaviour in sows. Applied Animal Behaviour Science 48: 249-262.

Lancia, R., J. W. Bishir, M. C. Conner, and C. Rosenberry. 1996. Use of catch-effort to estimate population size. Wildlife Society Bulletin 24: 731-737.

Marsan, A., A. Garrone, and S. Spano. 1996. Economic results and environmental restoration in the Apenninic area through the management of ungulates. Ricerche di Biologia della

Selvaggina 25: 145-157.

Massei, G., P. Genov, and B. Staines. 1996. Diet, food availability and reproduction of wild boar in a Mediterranean coastal area. Acta Theriologica 41: 307-320.

Motta, R. 1996. Impact of wild ungulates on forest regeneration and tree composition of mountain forests in the western Italian Alps. Forest Ecology and Management 88: 93-98.

This study assessed the impact of browsing by wild ungulates in mountain forests of the western Italian Alps. In this case, trees received the most damage of any vegetation type studied. Damage varied by tree species and by species of ungulate browsers. Because wild boars (*Sus scrofa)* are not browsers, they contributed little to overall tree damage. Boars did cause fraying damage, but this damage was subordinate to the severe damage caused by deer. Overall, damage increased as ungulate densities increased.

Saunders, G., and B. Kay. 1996. Movements and home range of feral pigs in Kosciusko National Park, NSW. Wildlife Research 23: 421-428.

Sweitzer, R., I. Gardner, B. Gonzales, D.Van Vuren, and W. Boyce. 1996. Population densities and disease surveys of wild pigs in the coast ranges of central and northern California. Vertebrate Pest Conference 17: 5-82.

Updike, D., and J. Waithman. 1996. Dealing with wild pig depredation in California: the strategic plan. Vertebrate Pest Conference 17: 40-43.

Young, R. J., and A. B. Lawrence. 1996. The effects of high and low rates of food reinforcement on the behaviour of pigs. Applied Animal Behaviour Science 49: 365-374.

1995

Ahmad, E., J. Brooks, I. Hussain, and M. Khan. 1995. Reproduction in Eurasian wild boar in central Punjab, Pakistan. Acta Theriologica 40: 163-173.

Alpe, D. 1995. Distribution and density of wild boar (*Sus scrofa*) through tracks survey in the Orsiera Rocciavre Natural Park, Piedmont (Italy). IBEX Journal of Mountain Ecology, 3: 209-210.

Anderson, S. 1995. Some environmental indicators related to feral pig activity in a Hawaiian rain forest. Thesis, University of Hawaii, Honolulu.

Asahi, M. 1995. Stomach contents of Japanese wild boar in winter. IBEX Journal of Mountain Ecology 3: 184-185.

Boitani, L., P. Trapanese, and L. Mattei. 1995. Demographic patterns of a wild boar (*Sus scrofa*) population in Tuscany, Italy. IBEX Journal of Mountain Ecology 3: 197-201.

Boitani, L., P. Trapanese, and L. Mattei. 1995. Methods of population estimates of a hunted wild boar (*Sus scrofa* L.) population in Tuscany (Italy). IBEX Journal of Mountain Ecology 3: 204-208.

Boitani, L, P. Trapanese, L. Mattei, and D. Nonis. 1995. Demography of a wild boar (*Sus scrofa*) population in Tuscany, Italy. Gibier Faune Sauvage 12: 109-132.

Caley, P., and B. Ottley. 1995. The effectiveness of hunting dogs for removing feral pigs (*Sus scrofa*). Wildlife Research 22: 147-154.

Cargnelutti, B., G. Janeau, G. Spitz, and S. Cousse. 1995. GIS as a means to identify the environmental conditions of wild boar diurnal resting places. IBEX Journal of Mountain Ecology 3: 156-159.

Choquenot, D. 1995. Habitat related visibility bias in helicopter counts of feral pigs in Australia's semi-arid rangelands. Wildlife Research 22: 569-578.

Choquenot, D. 1995. The dynamics of feral pig populations in the semi-arid rangelands of eastern Australia. Dissertation, University of Sydney, Sydney, Australia.

Choquenot, D., and B. Lukins. 1995. Costs and benefits of two wild pig populations in rangelands woolgrowing enterprises. Proceedings of the 10th Australian Vertebrate Pest Control Conference.

Corbett, L. 1995. Does dingo predation or buffalo competition regulate feral pig populations in the Australian wet-dry tropics? An experimental study. Wildlife Research 22: 65-74.

This study looked at the roles of dingoes and feral buffaloes in regulating feral pig (*Sus scrofa)* populations in the Australian wet-dry tropics. Although dingo predation on hogs increased with an increase in hog population, dingo predation alone did not regulate feral pig populations. However, when combined with interference competition by feral water buffalo, dingo predation appeared to help regulate pig populations. These observations seem to indicate that the combination of predation and competition is more important in the regulation of feral pig populations than either factor alone.

Csanyi, S. 1995. Wild boar population dynamics and management in Hungary. IBEX Journal of Mountain Ecology 3: 222-225.

D'Andrea, L., and P. Durio, et al. 1995. Preliminary data of the wild boar (*Sus scrofa*) space use in mountain environment. IBEX Journal of Mountain Ecology 3: 117-121.

Debernardi, P., E. Macchi, et al. 1995. Distribution of wild boar (*Sus scrofa*) in Piedmont and Aosta Valley (NW Italy). IBEX Journal of Mountain Ecology 3: 141-144.

Debernardi, P., E. Patriarca, et al. 1995. Wild boar (*Sus scrofa*) control in Regional Park "La Mandria" (Piedmont, NW Italy). IBEX Journal of Mountain Ecology 3: 237-240.

Durio, P., D. Fogliato, et al. 1995. The autumn diet of the wild boar (*Sus scrofa*) in an alpine valley. Preliminary results. IBEX Journal of Mountain Ecology 3: 180-183.

Durio, P., U. Gallo-Orsi, et al. 1995. Structure and monthly birth distribution of a wild boar population living in mountainous environment. IBEX Journal of Mountain Ecology 3: 202-220.

Eriksson, O., and M. Petrov. 1995. Wild boars (*Sus scrofa scrofa* L.) around Chernobyl, Ukraine. Seasonal feed choice in an environment under transition - a baseline study. IBEX Journal of Mountain Ecology 3: 171-173.

Fournier-Chambrillon, C., D. Maillard, and P. Fournier. 1995. Diet of the wild boar (*Sus scrofa* L.) inhabiting the Montpellier garrigue. IBEX Journal of Mountain Ecology 3: 174-179.

Fournier, P., D. Maillard, and C. Fournier-Chambrillon. 1995. Use of spotlights for capturing wild boar (*Sus scrofa* L.). IBEX Journal of Mountain Ecology 3: 131-133.

Fruzinski, B. 1995. Situation of wild boar populations in Western Poland. IBEX Journal of Mountain Ecology 3: 186-187.

Gallo-Orsi, U., B. Sicuro, P. Durio, L. Canalis, G. Mazzoni, E. Serzotti, and D. Chiariglione. 1995. Where and when: the ecological parameters affecting wild boars choice while rooting in grasslands in an Alpine valley. IBEX Journal of Mountain Ecology 3: 160-164.

Groot-Bruinderink, G. W. T. A., and E. Hazebroek. 1995. Modeling carrying capacity for wild boar (*Sus scrofa scrofa*) in a forest/heathland ecosystem. Wildlife Biology 1: 81-87.

Herrero, J., A. Garcia-Serrano, et al. 1995. Wild boar (*Sus scrofa* L.) hunting in southwestern Pyrenees (Spain): preliminary data. IBEX Journal of Mountain Ecology 3: 228-229.

Hone, J. 1995. Spatial and temporal aspects of vertebrate pest damage with emphasis on feral pigs. Journal of Applied Ecology 32: 311-319.

In this study, an index of feral hog damage was developed by using the occurrence of ground rooting as an index of changes in native vegetation in the Namadgi National Park. The most intense rooting was done in wet locations which, in the Namadgi National Park, are at higher elevations. Without control, the population was expected to increase rapidly and cause more damage. Control was accomplished by warfarin poisoning combined with some trapping. This control method succeeded in greatly reducing the feral hog population within the study area.

Ilse, L., and E. Hellgren. 1995. Spatial use and group dynamics of sympatric collared peccaries and feral hogs in southern Texas. Journal of Mammalogy 76: 993-1002.

Because peccary group size tends to be larger in areas without feral hogs, hogs are thought to have a negative impact on peccary density. This study investigated spatial use and group dynamics of collared peccaries and feral hogs in southern Texas. Feral hog home ranges on this site were larger in the summer than in the spring, but overall trends seemed to indicate that feral hog territory size was decreasing. Historical peccary decline may have resulted from feral hog invasion. However, this study suggests that the invasion of

feral hogs may be subsiding because of a decrease in hog territory size observed in the study, indicating a reversal of the previous hog invasion.

Ilse, L., and E. Hellgren. 1995. Resource partitioning in sympatric populations of collared peccaries and feral hogs in southern Texas. Journal of Mammalogy 76: 784-799.

This study looked at resource use in populations of collared peccaries and feral hogs in a southern Texas mesquite and live oak brushland. Researchers found that resource use varied by season with very little overlap between resources used by the two species. Although both suids followed crepuscular activity patterns, feral hogs were more reliant on water sources and used lakes and mesic areas more. Additionally, hogs were more dependent on grass. This suggests that each of these species fills its own niche without a great amount of competition for resources.

Janeau, G., B. Cargnelutti, S. Cousse, M. Hewison, and F. Spitz. 1995. Daily movement pattern variations in wild boar (*Sus scrofa* L.). IBEX Journal of Mountain Ecology 3: 98-101.

Janeau, G., S. Cousse, B. Cargnelutti, and F. Spitz. 1995. Role of daily movements in the social-spatial organization of wild boars (*Sus scrofa* L.) populations. Revue d'Ecologie: La Terre et la Vie 50: 35-48.

Kotanen, P. 1995. Responses of vegetation to a changing regime of disturbance: effects of feral pigs in a California coastal prairie. Ecography 18: 190-199.

Grubbing by pigs entails breaking through the surface layer of vegetation and excavating the soil to a depth ranging from 5 to 15 cm. This study investigated the effects of feral pigs on meadows in northern California. During this study, grubbed areas revegetated rapidly, but grubbing had significant effects on the composition of the affected vegetation. Initially, species richness was reduced in grubbed areas, but over time species richness of grubbed areas exceeded undisturbed sites. This increase in species richness was due to the grubbed sites being colonized by native annual. These data show that pigs can be seen either as enhancing or reducing biodiversity, depending upon the time scale of the measurement.

Macchi, E., B. Sicuro, et al. 1995. The wild boar's impact on agriculture in Piedmont (Italy): a study on administrative reports. IBEX Journal of Mountain Ecology 3: 236.

Marsan, A., S. Spano, et al. 1995. Management attempts of wild boar (*Sus scrofa* L): first results and outstanding researches in northern Apennines (Italy). IBEX Journal of Mountain Ecology 3: 219-221.

Maillard, D., and P. Fournier. 1995. Effects of shooting with hounds on size of resting range of wild boar (*Sus scrofa* L.) groups in Mediterranean habitat. IBEX Journal of Mountain Ecology 3: 102-107.

Mazzoni-della-Stella, R., F. Calovi, et al. 1995. The wild boar management in a province of the central Italy. IBEX Journal of Mountain Ecology 3: 213-216.

Mazzoni-della-Stella, R., F. Calovi, et al. 1995. Wild boar management in an area of southern Tuscany (Italy). IBEX Journal of Mountain Ecology 3: 217-218.

Moretti, M. 1995. Birth distribution, structure and dynamics of a hunted mountain population of wild boars (*Sus scrofa* L.). Ticino, Switzerland. IBEX Journal of Mountain Ecology 3: 192-196.

Nakatani, J., and Y. Ono. 1995. Grouping pattern of Japanese wild boar (*Sus scrofa leucomystax*) IBEX Journal of Mountain Ecology 3: 128-129.

Neet, C. 1995. Population dynamics and management of *Sus scrofa* in Western Switzerland: a statistical modeling approach. IBEX Journal of Mountain Ecology 3: 188-191.

Nores, C., F. Gonzalez, et al. 1995. Wild boar distribution trends in the last two centuries: an example in Northern Spain. IBEX Journal of Mountain Ecology 3: 137-140.

Okarma, H., B. Jedrzejewska, W. Jedrzejewski, Z. Krasinski, and L. Milkowski. 1995. The roles of predation, snow cover, acorn crop, and man-related factors on ungulate mortality in Bialowieza Primeval Forest, Poland. Acta Theriologica 40: 197-217.

Oliver, W. 1995. Taxonomy and conservation status of the suiformes - an overview. IBEX Journal of Mountain Ecology 3: 3-5.

Onida, P., F. Garau, et al. 1995. Damages caused to crops by wild boars (*Sus scrofa meridionalis*) in Sardinia (Italy). IBEX Journal of Mountain Ecology 3: 230-235.

Peracino, V., and B. Bassano. 1995. The wild boar (*Sus scrofa*) in the Gran Paradiso National Park (Italy): presence and distribution. IBEX Journal of Mountain Ecology 3: 145-146.

Russo, L., P. Genov, et al. 1995. Preliminary data of activity patterns of wild boar (*Sus scrofa*) in the Maremma Natural Park (Italy). IBEX Journal of Mountain Ecology 3: 126-127.

Saunders, G. 1995. Ecological comparison of two wild pig populations in semi-arid and sub-alpine Australia. IBEX Journal of Mountain Ecology 3: 152-156.

Spitz, F., and G. Janeau. 1995. Daily selection of habitat in wild boar (*Sus scrofa*). Journal of Zoology 237: 423-434.

Tolleson, D., W. Pinchak, D. Rollins, and L. Hunt. 1995. Feral hogs in the rolling plains of Texas: perspectives, problems, and potential. Great Plains Wildlife Damage Control Conference 12: 124-128.

The expansion of feral hogs into Texas has created many problems, including damage to agricultural crops, negative interaction with native plants and animals, and the spread of disease to humans. Feral hogs transmit brucellosis and psuedorabies to livestock. Between 1989 and 1994, crop damage due to feral hogs was reported to be between $10,000 and $300,000. The fact that white tailed deer avoid areas that have been used by pigs causes problems for managers trying to increase the deer population. Depredation of bobwhite quail nests by feral hogs also may become a problem in the Rolling Plains area of Texas. While these problems cause many people to oppose the encroachment of pigs, many support the spread of the animal, because it offers a hunting opportunity that is more affordable than hunting other big game species. With no natural predators other than mountain lions, the population of hogs cannot be controlled unless they are hunted.

Vassant, J., and S. Brandt. 1995. Adaptation du piegeage par enclos-piege de type corral pour la capture de compagnies de sangliers (*Sus scrofa*). Gibier Faune Sauvage 12: 51-61.

Walzer, C. 1995. Immobilization of wild boars with tiletamine-zolazepam. Wiener Tierarztliche Monatsschrift 82: 29-31.

Welander, J. 1995. Are wild boars a future threat to the Swedish flora? IBEX Journal of Mountain Ecology 3:165-167.

1994

Abaigar, T., G. del Barrio, and J. Vericad. 1994. Habitat preference of wild boar (*Sus scrofa*) in the Mediterranean environment: indirect evaluation by signs. Mammalia 58: 201-210.

Anderson, S., and C. Stone. 1994. Indexing sizes of feral pig populations in a variety of Hawaiian natural areas. Transactions of the Western Section of the Wildlife Society 30: 26-39.

Aubert, M., M. Picard, et al. 1994. La peste porcine classique du sanglier en Europe. Annales de Medecine Veterinaire 138: 239-247.

Awasthi, A., S. Sharma, and M. Das. 1994. Evaluation and status assessment of Panna National Park. Environment and Ecology 12: 685-689.

Boitani, L., M. Livia, N. Domitilla, and C. Fabio. 1994. Spatial and activity patterns of wild boars in Tuscany, Italy. Journal of Mammalogy 75: 600-612.

In this study, the home ranges of wild boars in Italy were assessed using radio collars to locate the boars as they traveled throughout the day. Although there was no clear preference for habitat (probably due to the homogeneity of the study area), and the data did not show any consistent patterns in home range size, there were some overall trends observed. The home ranges of males were flexible and less intensively used than those of females. The home ranges of females overlapped, while male home ranges were more exclusive. Some female home ranges overlapped cultivated areas. Each home range contained a core area with preferred resting sites and feeding areas. The resting areas were continuously occupied, but the feeding areas were only visited periodically. The wild boars on this study site were mostly active at night and rested during the daytime. These data suggest plasticity of the spatial and activity patterns of wild boars.

Brownlow, M. 1994. Towards a framework of understanding for the integration of forestry with domestic pig (*Sus scrofa doesmestiica*) and European wild boar (*Sus scrofa scrofa*) husbandry in the United Kingdom. Forestry 67: 189-218.

Caley, P. 1994. Factors affecting the success rate of traps for catching feral pigs in a tropical habitat. Wildlife Research 21: 287-292.

Cary, E., M. Sheffield, and W. Sheffield. 1994. Exotics on the range. Texas A & M University Press, College Station.

Cousse, S., F. Spitz, M. Hewison, and G. Janeau. 1994. Use of space by juveniles in relation to their postnatal range, mother, and siblings: an example in the wild boar, *Sus scrofa*. Canadian Journal of Zoology 72: 1691-1694.

The use of radiolocation with 8 juvenile boars showed that their location relative to their postnatal range was independent of the mother and siblings. Juveniles showed a degree of attachment to their postnatal range, but the surrounding areas were preferred. Juveniles were just as likely to be found with their mother as without her, but tended to separate from their mothers at times of exploration outside the postnatal range.

Csanyi, S. 1994. Moving toward coordinated management of timber and other resource uses in Hungarian forests. Forestry Chronicle 70: 555-561.

Fournier-Chambrillon, C., D. Maillard, and P. Fournier. 1994. Le regime alimentaire du sanglier en milieu mediterraneen: approche des degats sur vignes. Gestion du Sanglier, Actes Coll. Bergerac. Off. Nalt. Chasse Bull. Mens. 191: 36-47.

Genov, P., G. Massei, and W. Kstova. 1994. The utilization of wild boar (*Sus scrofa*) in Europe in theory and practice. Zeitschrift fur Jagdwissenschaft 40: 263-267.

Groot-Bruinderink, G. W. T. A., E. Hazebroek, and H. van der Voot. 1994. Diet and conditioning of wild boar, *Sus scrofa scrofa*, without supplementary feeding. Journal of Zoology 233: 631-648.

Groot-Bruinderink, G. W. T. A., E. Hazebroek, and H. van der Voot. 1994. Density-dependent resource limitation in non-supplementarily fed wild boar. Transactions of the Congress of the International Union of Game Biologists 21: 327-331.

Wild boars in the Netherlands were given supplementary feed in order to maintain their numbers in an area that would not otherwise support the animals. Once the supplemental feeding stopped, the main staple was mast. When mast was depleted the boars ate roots and wavy grass, but these did not supply enough nutrients. This resulted in decreased weight, decreased fat stores, and reproductive failure among wild boars in the area.

Ilse, L. 1994. Resource partitioning by sympatric populations of feral hogs and collared peccaries (*Sus scrofa, Tayassu tajacu*) in south Texas. Thesis, Texas A&M University, Kingsville.

Jedrzejewska, B., H. Okarma, W. Jedrzejewski, and L. Milkowski. 1994. Effects of exploitation and protection on forest structure, ungulate density and wolf predation in Bialowieza Primeval Forest, Poland. Journal of Applied Ecology 31: 664-676.

Kotanen, P. M. 1994. Effects of feral pigs on grasslands. Fremontia 22: 14-17.
The Northern California Coast Range Preserve (NCCRP) contains meadows that are grubbed by feral pigs all year long. This study assessed the dynamics of grubbing by pigs on a site in this area. Pigs grubbed an average of seven percent of the total area in the study area. Although the average depth of grubbing was less than 4 inches, grubbing removed, buried, and disturbed the seed bed and the surface vegetation. The removal of vegetation led to altered soil conditions such as increased soil temperatures and increased nitrogen content. Grubbing also created large, unattractive open spaces, reduced perennial cover, and encouraged alien annual grasses. However, there were also positive benefits of grubbing by feral hogs, such as increased diversity in native plants. However, this may not be the case in areas where native plants are not resistant to disturbance and cannot out-compete aggressive alien plants.

Lusk, M., M. Lacki, and R, Lancia. 1994. Responses of deer mice (*Peromyscus maniculatus*) (Mammalia: Rodentia) to wild hog rooting in the Great Smoky Mountains National Park. Brimleyana 19: 169-184.

A mark-recapture study was conducted to assess the impact of wild hog rooting on small mammal populations in the beech forests in the Great Smoky Mountain National Park. Small mammals were captured using live traps and pitfalls. Microhabitat variables were measured near each live trap. Populations of deer mice showed no significant difference between rooted and unrooted sites indicating that they may not be affected by the rooting of pigs.

Massei, G. 1994. Pine tree selection and rubbing of wild boar in a Mediterranean coastal area. Ethology Ecology and Evolution 6: 433.

Palotas, G. 1994. Habitat-overlap of four wild ungulates in a Hungarian contiguous lowland forest. Transactions of the Congress of the International Union Game Biologists 21: 337-342.

Palotas, G., and P. Bartucz. 1994. Dispersion and niche-overlap of big game in a contiguous lowland forest. Vadbiologia 4: 18-26.

Wolkers, J. T., J. Wensing, and G. W. T. A. Groot-Bruinderink. 1994. Sedation of wild boar (*Sus scrofa)* and red deer (*Cervus elaphus*) with medetomidine and the influence on some hematological and serum biochemical variables. Veterinary Quarterly 16: 7-9.

Wolkers, J., T. Wensing, J. T. Schonewille, and A. T. van't Klooster. 1994. Undernutrition in relation to changed tissue composition in wild boar (*Sus scrofa*). Comparative Biochemistry and Physiology 108: 623-628.

1993

Anderson, S., and C. Stone. 1993. Snaring to control feral pigs *Sus scrofa* in a remote Hawaiian rain forest. Biological Conservation 63: 195-201.

Feral pig activity was monitored in Hawaii to obtain indices of population size and to evaluate the effectiveness of control methods. Several pigs were radio collared to determine home range and patterns of movement. Snaring was the main control method used, and it proved to be the most effective way of removing the largest number of the pigs in the study area. Hunters with dogs also were used to kill pigs that had become trap shy.

Babbitt, K., and J. Lincer. 1993. Predation on artificial ground nest in southwest Florida. Florida Scientist 56: 118-121.

Caley, P. 1993. Population dynamics of feral pigs in a tropical riverine habitat complex (*Sus scrofa*). Wildlife Research 20: 625-636.

Using mark-recapture techniques to monitor trends in population densities of feral pigs made it possible to compare pig densities in woodland habitat with cereal crops to those areas without crops. Comparison of the two habitats showed that the presence of cereal crops increased the population density of feral pigs almost four-fold.

Choquenot, D., R. Kilgour, and R. Lukins. 1993. An evaluation of feral pig trapping. Wildlife Research 20: 15-22.

The effectiveness of trapping was examined to reduce feral pig populations and the tendency of trapping to preferentially remove sows. Trapping was done with food baits at 2 sites. Proportional bait take indicated that pig abundance was reduced 100% in 16 nights and 93% in 18 nights for the 2 sites where conventional trapping was used. Spotlight counts estimated reductions of 81% and 83% respectively. Although the sex ratios of pigs at both sites were equal before trapping, sex ratios of trapped pigs were biased in favor of females.

Choquenot, D., and G. Saunders. 1993. A comparison of three aging techniques for feral pigs from subalpine and semi-arid habitats. Wildlife Research 20: 163-171.

Dzieciolowski, R. M., C. M. H. Clarke, and C. M. Frampton. Reproductive characteristics of feral pigs in New Zealand. Acta Theriologica 37: 259-270.

Fadeev, E. 1993. Spatial structure of the wild boar population in the Volga Basin near Saratov. Moscow State University Biological Sciences Bulletin 48: 26-31.

Gaillard, J., S. Brandt, and J. Jullien. 1993. Body weight effect on reproduction of young wild boar (*Sus scrofa)* females: a comparative analysis. Folia Zoologica 42: 204-212.

Ish-Shalom-Gordon, N. 1993. Seed dispersal by cattle, deer, and wild pigs, in Mediterranean rangelands of the Golan Heights. Ecological Society of America Bulletin 74: 289.

Jedrzejewski, W., K. Schmidt, L. Milkowsi, B. Jedrzejewska, and H. Okarma. 1993. Foraging by lynx and its role in ungulate mortality: the local (Bialowieza Forest) and the palearctic viewpoints. Acta Theriologica 38: 385-403.

Katahira, L., P. Finnegan, and C. Stone. 1993. Eradicating feral pigs in montane mesic habitat at Hawaii Volcanoes National Park. Wildlife Society Bulletin 21: 269-274.

Feral pigs were systematically removed from the Hawaii Volcanoes National Park. The removal began in 1980 when 175 pigs were removed from the area. The main control method used was hunting with dogs. This study shows that continual control with high removal rates can effectively eradicate or reduce feral pig populations to low levels within a few years, but periodic control is less successful. Hunts conducted during breeding and farrowing periods are most successful, because capturing entire family groups is more probable during these times.

Mautz, W. 1993. Decline and recovery of a *Xantusia riversiana* population following habitat damage by feral pigs. American Zoologist 33: 144.

McIlroy, J., E. Gifford, and R. Forrester. 1993. Seasonal patterns in bait consumption by feral pigs (*Sus scrofa)* in the hill country of southeastern Australia. Wildlife Research 20: 637-651.

Moe, S. 1993. Mineral content and wildlife use of soil licks in southwestern Nepal. Canadian Journal of Zoology 71: 933-936.

Pellerin, J. 1993. Relations interspecifiques entre le chevreuil (*Capreolus capreolus* L.) et le sanglier (*Sus scrofa*). Bulletin d'Ecologie 24: 179-189.

Saunders, G. 1993. Observations on the effectiveness of shooting feral pigs from helicopters. Wildlife Research 20: 771-776.

Studies were conducted on the effectiveness of shooting feral pigs to reduce population sizes. Estimated population reductions over two consecutive years were 80% and 65% respectively. However, within 12 months the population had recovered by 77%.

Saunders, G. 1993. The demography of feral pigs (*Sus scrofa*) in Kosciusko National Park, New South Wales. Wildlife Research 20: 559-569.

Saunders, G., B. Kay, and H. Nicol. 1993. Factors affecting bait uptake and trapping success for feral pigs (*Sus scrofa)* in Kosciusko National Park. Wildlife Research 20: 653-665.

Tolleson, D. R., D. Rollins, W. E. Pinchak, M. Ivy, and A. Heirman. 1993. Impact of feral hogs on ground nesting gamebirds. Pages 76-83 *in* C. W. Hanselka and J. F. Cadenhead, editors. Feral swine: a compendium for resource managers. Texas Agricultural Extension Service, Kerrville, USA.

Vtorov, I. 1993. Feral pig removal: effects on soil microarthropods in a Hawaiian rain forest. Journal of Wildlife Management 57: 875-880.

The purpose of this study was to assess the effects of feral pigs on soil microarthropods in a Hawaiian rain forest. The author concludes that depletion of the microarthropods is caused by the rooting of feral pigs which have devastated soil microarthropod communities. The author also reports that fencing and removal of pigs can restore the organism within 7 years. Unfortunately this is an anecdotal study in which the author compared a single site with pigs to 3 sites where pigs had been removed. Lack of replication and poor experimental design means that it may be unwise to draw firm conclusions from this study.

1992

Abaigar, T. 1992. Reproductive parameters in wild boar (*Sus scrofa*) from the south Iberian Peninsula. Mammalia 56: 245-250.

Cousse, S., G. Janeau, and F. Spitz. 1992. Telemetry on free-ranging wild boars (*Sus scrofa*): temporal and spatial structure of daily movements. Pages 693-697 *in* I.G. Priede, and S.M. Swift, editors. Wildlife telemetry: remote monitoring and tracking of animals. Ellis Horwood.

Cruveille, M., and B. Boisaubert. 1992. Statut actuel des ongules sauvages en montagne Francaise. Office National de la Chasse – Bulletin Mensuel 167: 13-20.

Gerard, J. F., B. Cargnelutti, and F. Spitz, 1992. Relation entre anisotropie de l'occupation de l'espace er dispersion: un exemple chez le sanglier du sud-ouest de la France. Mammalia 56: 177-187.

Hone, J. 1992. Modelling of poisoning for vertebrate pest control with emphasis on poisoning feral pigs. Ecological Modeling 62: 311-327.

Klaa, K. 1992. The diet of wild boar (*Sus scrofa* L.) in the national park of Chrea (Algeria). Pages 403-307 *in* F. Spitz, F, G. Janeau, G. Gonzalez, and S. Aulagnier, editors. Ongules/ ungulates 91. Institute Techerche Grand Mammiferes, Paris-Toulouse, France.

Lockow, K. W., and C. Stubbe. 1992. Neue methoden der alterbestimmung am erlegten schwarzwild (*Sus scrofa*). Zeitschrift fuer Jagdwissenschaft 38: 73-80.

McIlroy, J. C. 1992. The effect on Australian animals of 1080-poisoning campaigns. Vertebrate Pest Conference 15:356-359.

Pavlov, P. M., F. H. J. Crome, and L. A. Moore. 1992. Feral pigs, rain-forest conservation and exotic disease in North Queensland. Wildlife Research 19: 179-193.

Pegel, M. 1992. Schwarzwild – problemart der kuenftigen Jahre? Der Jaeger in Baden-Wuerttemberg 37: 10-12.

Quenetter, P. Y., and J. P. Desportes. 1992. Temporal and sequential structure of vigilance behavior of wild boar (*Sus scrofa*). Journal of Mammalogy 73: 535-540.

Quenette, P. Y., and J. F. Gerard. 1992. From individual to collective vigilance in wild boar (*Sus scrofa*). Canadian Journal of Zoology 70: 1632-1635

Vassant, J., S. Brandt, and J. Jullien. 1992. Des sangliers encore plus sedentaires qu'il etait imaginable de le croire. Office National de la Chasse – Bulletin Mensuel 165: 31-39.

Wlazelko, M., and L. Labudzki. 1992. Ueber die nahrungskomponenten und die trophische stellung des schwarzwildes im Forschungsgebiet Zielonka. Zeitschrift fuer Jagdwissenschaft 38: 82-87.

1991

Aplet, G., S. Anderson, and C. Stone. 1991. Association between feral pig disturbance and the composition of some alien plant assemblages in Hawaii Volcanoes National Park. Vegetation 95: 55-62.

Results from this showed that the density of some exotic plant species was lower in areas where pigs root, the density of other exotic plants was higher in areas where pigs root, and the density of some exotic plants was unaffected by pig rooting in Hawaii Volcano National Park.

Ashby, K., and C. Santiapillai. 1991. Population age structure of the wild pig *Sus scrofa* in Ruhuna National Park, Sri Lanka. Transactions of the Congress of the International Union of Game Biologists 18: 533-535.

Badia, J., F. Spitz, and G. Valet. 1991. Estimate of the size of a hunted population. Ecological Modelling 55: 113-122.

Bowman, D. M. J. S., and L. McDonough. 1991. Feral pig (*Sus scrofa*) rooting in a monsoon forest-wetland transition, northern Australia. Wildlife Research 18: 761-765.

This study assessed the impact of feral hog rooting on wetland and lowland evergreen monsoon forests in northern Australia. These areas were thought to suffer adverse effects due to feral pig rooting. The vegetation in the area consisted of small patches that were of high value to nature conservation. The pigs used the rainforest during the heat of the day, but foraged in adjacent areas. This study indicated that the effect of pigs on the monsoon rainforest minimal.

Bowman, D. M. J. S., and W. J. Panton. 1991. Sign and habitat impact of banteng (*Bos javanicus)* and pig (*Sus scrofa)*, Cobourg Pennisula, northern Australia. Australian Journal of Ecology 16: 15.

Cargnelutti, B., J. F. Gerard, et al. 1991. Resultat preliminaries sur l'eco-ethologie du sanglier (*Sus scrofa*) en region agricole a faible taux de boisement. Office National de la Chasse – Bulletin Mensuel 163: 15-20.

Casanova, P., A. Capaccioli, L. Cellini, and G, Bisogno. 1991. Aspects of competition between roe deer (*Capreolus capreolus*) and wild boar (*Sus scrofa*) in some areas of Appennine Tosca-Romangna. Ist. Nazl. Biol. Selvaggina 19: 647-648.

Clarke, C. H. M., and R. M. Dzieciolowski. 1991. Feral pigs in northern South Island, New Zealand: I. Origin, distribution and density. Journal of the Royal Society of New Zealand 21: 237-247.

Clarke, C. H. M., and R. M. Dzieciolowski. 1991. Feral pigs in northern South Island, New Zealand: II. Breed composition of present populations. Journal of the Royal Society of New Zealand 21: 249-260.

Dinter, U. 1991. Das raum-zeitverhalten von schwarzwild im Grunewald in dem sommermonaten unter besonderer beruecksichtigung menschlicher stoerungen. Dissertation, Tiermedizinische Fakultaet Ludwig-Maximilians- Universitaet Muenchen.

Dotson, T., and C. J. Winand. 1991. Immobilization of European wild hogs with azaperone and ketamine: an alternative. Southeastern Association of Fish and Wildlife Agencies 45:175-177.

Dzieciolowski, R. 1991. Ecological niches of five big ungulates in a forest tract. Folia Forestalia Polonica. Series A. Lesnictwo 3: 56-70.

Focardi, S., S. Toso, F. Pampiro, P. Ruiu, and A. Pintus. 1991. The diet of ungulates in a coastal Mediterranean forest. Transactions of the Congress of the International Union of Game Biologists 20: 78-87.

Fuhrer, E., and P. Fischer. 1991. Towards integrated control of *Cephalcia abietis*, a defoliator of Norway in central Europe. Forest Ecology and Management 39: 87-95.

In central Europe, the false spruce webworm (*Cephalcia abietis)* causes defoliation of Norway spruce trees. Chemical controls of this pest have been inefficient, because the worms have webs that interfere with intake of the toxin. Because high densities of boars are capable of causing high mortality to insect larvae, confining feral pigs to the area is a potential form of nonchemical control. Fencing of wild boars into an infested area for one year decreased the density of worms by 70%. Although the hogs control the worms, their grubbing caused damage to tree roots, leaving the tree vulnerable to disease. Control of the false spruce webworm by confining large numbers of hogs in the area is recommended when an outbreak of *C. abietis* is already in progress, but doing so may cause more damage than good in some cases.

Fujisaka, S., G. Kirk, J. A. Litsinger, K. Moody, N. Hosen, A. Yusef, F. Nurdin, T. Naim, F. Artati, A. Aziz, W. Khatib, and Yustisia. 1991. Wild pigs, poor soils, and upland rice: a diagnostic survey of Sitiung, Sumatra, Indonesia. IRRI Research Paper Series 155.

Gerard, J. F., B. Cargnelutti, F. Spitz, G. Valet, and T. Sardin. 1991. Habitat use of wild boar in a French agroecosystem from late winter to early summer. Acta Theriologica 36: 119-129.

Gerard, J. F., P. Teillaud, F. Spitz, R. Mauget, and R. Campan. 1991. The wild boar. Revue d'Ecologie: La Terre er la Vie Suppl 6: 11-66.

Izac, A. M. N., and P. O'Brien. 1991. Conflict, uncertainty and risk in feral pig management: the Australian approach. Journal of Environmental Management 32: 1-18.

Janeau, G., S. Cousse, and F. Spitz. 1991. Activity pattern of wild boar (*Sus scrofa*). Biotelemetry 11: 123-127.

Jullien, J., S. Brandt, et al. 1991. Des saingliers chasses en battue en foret domaniale de Chateauvillain / Arc-en-Barrios Leurs "strategies" pour echapper aux chasseurs et aux chiens. Office National de la Chasse – Bulletin Mensuel 162: 29-36.

Kanzaki, N., and E. Ohtsuka. 1991. Winter diet and reproduction of Japanese wild boars i*n* Wildlife conservation: present trends and perspectives for the 21st Century. Proceedings of International Symposium of Wildlife Conservation. Japan Aug 21-25, 1990. Intern. Congr. Ecol. Intecol 5: 217-219.

Khun, D. Z., and L. S. Kan. 1991. Population of some mammals in the Sclerophylous evergreen tropic forests near Konhkanyng (South Vietnam). Zoologicheskii Zhurnal 70: 114-118.

Khun, D. Z., L. S. Kan, and Y. G. Puzachenko. 1991. Large mammals of small-leaved deciduous forests in the Srepok river basin (South Vietnam). Zoologicheskii Zhurnal 70: 154-157.

Kohalmy, T. 1991. Assessment of wild boar stocks in Hungary. Transactions of the Congress of the International Union of Game Biologists 20: 99.

Labudzki, L. 1991. Seasonal dynamics of damages by wild boar (*Sus scrofa*) to agricultural fields in west central Poland. Transactions of the Congress of the International Union of Game Biologists 20: 117-124.

Labudzki, L., and M. Wlazelko. 1991. Seasonal dynamics of crop damage caused by wild boar in the research area Zielonka. Zeitschrift fur Jagdwissenschaft 37: 250-257.

Macdonal, A. A., and H. Faedrich. 1991. Pigs and peccaries: what are they? Pages 7-21 *in* R. H. Barrett, and F. Spitz, editors. Biology of Suidae. Imprimerie des Escartons, Briancon, France.

Mackey, W. 1991. The implications of the importation of wild hogs on the northern United States. Proceedings Annual Meeting of the US Animal Health Association 401-403.

Mauget, R. 1991. Reproductive biology of wild Suidae. Pages 49-64 *in* R. H. Barrett, and F. Spitz, editors. Biology of Suidae. Imprimerie des Escartons, Briancon, France.

Mauget, R., and D. Pepin, 1991. Energy intake, growth and timing of puberty in the European wild boar *Sus Scrofa*. Transactions of the Congress of the International Union of Game Biologists 18: 205-209.

Mayer, J. J., and I. L. Brisbin Jr. 1991. Wild pigs of the United States: their history, morphology and current status. University of Georgia Press, Athens, Georgia.

Moretti, M. 1991. Saisonale raumverteilung, habitatnutzung und standortwahl des wildschweines (*Sus scrofa*) in einem berggebiet auf der Alpensuedseite der Schweiz (Malcantone, Tessin). Diplomarbeit Universitaet Zuerich.

Nieznanski, K. 1991. Economic evaluation of game management based on data from Krosno, Przemysl and Rzeszow forest regions, Poland. Sylwan 131: 33-42.

Nyenhuis, H. 1991. Feindbeziehung zwischen waldschnepfe (*Scolopax rusticola*), raubwild und wildschwein (*Sus scrofa*). Allgemeine Forst – und Jagdzeitung 162: 174-180.

Pavlov, P. 1991. Reproduction of feral pigs from eastern Australia. Transactions of the Congress of the International Union of Game Biologists 18: 215-218.

Poglayen, G. 1991. The importance of the parasitological data in the wild mammals management. Ist. Nazl. Biol. Selvaggina 19: 383-391.

Saenz de Buruaga, M., L. Costa, and F. Purroy. 1991. Distribution and abundance of three wild ungulates in the Cantabrian Mountains in northern Spain. Transactions of the Congress of the International Union of Game Biologists 18: 627-630.

Saunders, G., and B. Kay. 1991. Movements of feral pigs (*Sus Scrofa*) at Sunny Corner, New South Wales. Wildlife Research 18: 49-61.

Schmid-Vielgut, B., M. Dopf, and H. Bogenschetz. 1991. Einfluss von gegattertem schwarzwild auf die populationsdichte des waldmaikaefers. Allgemeine Forst Zeitschrift 46: 719-721.

Schmidt, A., and C. R. Schmidt. 1991. Das buch der tierfamilien: schweine und pekaris. Kiderbuchverlag Luzern.

Spitz, F., and G. Valet. 1991. Etude demographique des sangliers du Languedoc. Office National de la Chasse-Bulletin Mensuel 159:28-39.

Sterner, J. D., and R. H. Barrett. 1991. Removing feral pigs from Santa Cruz Island, California. Transactions of the Western Section of the Wildlife Society 27: 47-53.

Santa Cruz Island, California has been subjected to the impacts of feral pigs and sheep since the 1850s. In 1987, The Nature Conservancy began a program designed to eradicate pigs from the island. Trapping was the most effective way to remove pigs, but pigs that were trap shy needed to be removed by other means. Hunters with dogs were effective at removing these trap shy pigs.

Stone, C. P. 1991. Feral pig (*Sus scrofa*) research and management in Hawaii. Pages 141-154 *in* R. H. Barrett, and F. Spitz, editors. Biology of Suidae. Imprimerie des Escartons, Briancon, France.

Feral pigs are having a serious impact on native ecosystems otherwise protected by park status. Because pigs prefer tree ferns as food, fern density and population structure can be affected by consumption and rooting. Plant species diversity is reduced and structure of vegetation near the ground is simplified when pigs forage in an area. This opening of the understory by pigs allows invasive plant species to become established, compete with native species, and alter ecosystem structure. Soil compaction and removal of plant cover by pigs increases rain runoff and erosion. Periodic disturbance by pig rooting can also lead to the permanent loss of soil organisms important for nutrient cycling and the decay of plant material.

Szczegola, M. 1991. The intensity of rooting in different parts of forest habitat in the annual cycle. Transactions of the Congress of the International Union of Game Biologists 20: 195-198.

Several studies were conducted to investigate the feeding habits of wild boars in a forest habitat. The results of these studies showed that from February to April wild boars mostly rooted in habitats containing coniferous forests. However, beginning in August they fed more intensively in deciduous habitats. There was also some indication that boars were able to consume large numbers of forest insect pests, making them beneficial in the management of forest insects.

Szukiel, E., and Z. Lewandowski. 1991. Effect of treating the forest with potato effluent on the life of ungulates. Sylwan 135: 23-34.

Taylor, R. 1991. The feral hog in Texas. Texas Parks Wildlife Department. Austin, Texas.

Tsarev, S. A. 1991. Cyclic variations of the social structure in wild boar groups (*Sus scrofa*). Zoologicheskii Zhurnal 70: 97-109.

1990

Belden, R., and W. Frakenberger. 1990. Biology of a feral hog population in south central Florida. Southeastern Association of Fish and Wildlife Agencies 44: 231-242.

Bouldoire, J. 1990. Consequences de l'importance economique des degats de sangliers (*Sus scrofa)* et de cerfs (*Cervus elaphus)* en milieu agricole sur l'evolution quantitative de ces populations. Transactions of the Congress of the International Union of Game Biologists 16: 386-398.

Cargnelutti, B., J. F. Gerard, F. Spitz, G. Valet, and T. Sardin. 1990. Wild boar (*Sus scrofa)* occupation of habitat in a by farm-mechanization modified agro-ecosystem. Gibier Faune Sauvage 7: 53-66.

Choquenot, D., B. Kay, and B. Lukins. 1990. An evaluation of warfarin for the control of feral pigs. Journal of Wildlife Management 54: 353-359.

Choquenot, D., and P. O'Brien. 1990. Management of feral pigs in Australia. Transactions of the Congress of the International Union of Game Biologists 19: 503-509.

Cuartas, P., and F. Braza. 1990. Time budget of activities of wild boar (*Sus scrofa)* at Donana (SW Espana). Donana (Acta Vertebrata) 17: 91-102.

Dardaillon, M. 1990. Activites humaines et regime alimentaire du sanglier (*Sus scrofa)* en Camargue (sud de la France). Transactions of the Congress of the International Union of Game Biologists 16: 346-351.

Dzieciolowski, R. M., C. M. H. Clarke, and B. J. Fredric. 1990. Growth of feral pigs in New Zealand. Acta Theriologica 35: 77-88.

Fadeyev, E. 1990. Towards the restoration of the ungulate fauna in forests in the middle Don flow area. Moscow State University Biological Sciences Bulletin 45: 47-53.

Fletcher, W. O., T. E. Creekmore, M. S. Smith, and V. F. Nettles. 1990. A field trial to determine feasibility of delivering oral vaccines to wild swine. Journal of Wildlife Disease 26: 502-510.

A vaccine for pseudorabies and/or swine brucellosis was placed in fish meal containing a marker designed to allow researchers to assess which animals received the vaccine. Although deer and other animals were present, the only non-target animals to take in the vaccine were raccoons. Approximately four baits were taken by each animal, and 95% of the baits were taken within 72 hours. Late summer was the best time to distribute baits, because natural food supplies are low during that season.

Fruzinski, B. 1990. Management of wild boar populations in Poland. Transactions of the Congress of the International Union of Game Biologists 19: 62 abstract only.

Hone, J. 1990. Note on seasonal changes in population density of feral pigs in three tropical habitats. Wildlife Research 17: 131-134.

Hone, J. 1990. Predator-prey theory and feral pig control, with emphasis on evaluation of shooting from a helicopter. Wildlife Research 17: 123-130.

Hone, J. 1990. How many feral pigs in Australia? Wildlife Research 17: 571-572.

Janeau, G., and F. Spitz. 1990. Dispersal in relation to density in wild boar. Transactions of the Congress of the International Union of Game Biologists 19: 59-62.

Jullien, J. M., J. Vassant, and S. Brandt. 1990. Mise au point d'un collier emetteur extensible pour sanglier (*Sus scrofa scrofa)* après atude du developpement de l'encolure chez l'espece. Gibier Faune Sauvage 7: 377-387.

Middleton, B., and D. Mason. 1990. Seed dispersal by herbivores in monsoonal wetlands of the Keoladeo National Park, India. Ecological Society of America Bulletin 71: 253-254 abstract only.

Neuhaeuser, P., J. Schuh, and M. Stubbe. 1990. Verhaltensoekologie und soziobiologische aspekte der populationsdynamik von Grossaeugern. Hercynia 27: 101-126.

O'Brien, P., and B. Lukins. 1990. Comparative dose-response relationships and acceptability of warfarin, Brodifacoum and phosphorus to feral pigs. Wildlife Research 17: 101-112.

Pavlov, P. 1990. Animal damage control in Australia. Transactions of the Congress of the International Union of Game Biologists 19: 540-542.

Peart, D., and D. Pattern. 1990. The impact of feral pig foraging on oak woodland vegetation on Santa Cruz Island, California. Ecological Society of America Bulletin 71: 282 abstract only.

Peine, J., and J. Farmer. 1990. Wild hog management program at Great Smoky Mountain National Park. Vertebrate Pest Conference 14: 221-227.

The growing number of hogs in the Great Smoky Mountains National Park compete with other wildlife for space and food and cause considerable damage to natural systems. Hog rooting has a tremendous impact on the vegetation in the forest. In fact, rooting in gray beech forests can reduce herbaceous understory cover to less than 5% of its expected value. The disturbed plant species exhibit changes in population structure and species composition that favor plants with deep or poisonous roots. Rooting also may aid in the proliferation of a fungus that infects beech trees. Exclosures were established to evaluate the impacts of hog rooting on vegetation. The total cover in these exclosures quickly returned to previous levels, but species composition was slow to return to prerooting levels. Red-back voles and short-tailed shrews that depend on leaf litter for habitat were nearly eliminated from some rooted areas. Furthermore, the red-cheeked salamander and the Jones middle-toothed snail are two potentially threatened species that are consumed by hogs. Direct predation and habitat destruction reduced the numbers of microinvertebrates in the soil by an estimated 80%. Rooting also accelerated soil erosion and increased siltation in rivers and streams.

Saunders, G. 1990. Evaluation of feral pig management strategies in N.S.W. Australia. Transactions of the Congress of the International Union of Game Biologists 19: 337-339.

Saunders, G., B. Kay, and B. Parker. 1990. Evaluation of warfarin poisoning program for feral pigs (*Sus Scrofa*). Wildlife Research 17: 525-533.

Schauss, M., H. Colleto, and M. Kutilek. 1990. Population characteristics of wild pigs, *Sus scrofa,* in eastern Santa Clara County, California. California Fish and Game 76: 68-77.

Schreiber, R. 1990. Zum auftreten und zur taxation von wildschaeden in landwirtschaftlichen Kulturen. Beitraege zur Jagd-und Wildforschung 17: 202-213.

Skewes-Ramm, O. 1990. Status des wildschweins, *Sus scrofa*, in Chile: dokumenation einer fremdansiedlung von europaeischem wild. Dissertation, Universitaet Goettingen.

Spitz, F., and G. Janeau. 1990. Spatial strategies: an attempt to classify daily movements of wild boar. Acta Theriologica 35: 129-149.

Szukiel, E. 1990. Influence of big herbivores upon the regeneration of forest in Poland and damage control. Transactions of the Congress of the International Union of Game Biologists 16: 407-412.

Weber, P. 1990. Beobachtungen zum zusammentreffen von braunbaeren (*Ursus arctos)* und schwarzwild (*Sus scrofa)* in freier wildbahn. Waldhygiene 18: 201-214.

1989

Akoshegyi, I. 1989. Experiences of wild boar immobilization. Vadbiologia 3: 141-144.

Altmann, D. 1989. Sozialverhalten und revierverteidigung in beziehung zur tageszeit beim wildschwein *Sus scrofa*. Beitraege zur Jagd und Wildforschung 16: 202-211.

Baettig, M. 1989. Angewandte wildforschung im kanton jura: habitat biologie – Feldschaeden – jagd des wildschweins (*Sus scrofa*). Zusammenfassung und Synthese. Fel Wald Wasser 77: 7-15.

Bayliss, P., and K. M. Yeomans. 1989. Distribution and abundance of feral livestock in the 'top end' of the Northern Territory (1985-86), and their relation to population control. Wildlife Research 16: 651-676.

Betti, R., and M. Teloni. 1989. Ideazione e sperimentazione di un metodo per la stima del carico ottimaledi ungulate selvatici. Italia Forestale e Montana 44: 291-306.

Bouldoire, J., and J. Vassant. 1989. Le sanglier. Hatier, Paris, France.

Braza, F., and F. Alvarez. 1989. Habitat use and social behavior of wild boars (*Sus scrofa)* on the Doñana reserve (Spain). Canadian Journal of Zoology 67: 2047-2051.

Briedermann, L. 1989. Schwarzwild *Sus scrofa*. Pages 250-283 *in* H. Stubbe, editor. Buch der Hege, Band 1 Haarwild.

Brooks, J. E., E, Ahmad, I. Hussain, and M. H. Khan. 1989. The agricultural importance of the wild boar (*Sus scrofa*) in Pakistan. Tropical Pest Management 35: 278-281.

Buzgo, J. 1989. Wild boar reproduction biology and population dynamics in the Sellye hunting revier of the Mecsek State Forestry. Vadbiologia 3: 171-172.

Calovi, F. 1989. Fauna e foresta: un binomio spesso trascurato. Italia Forestale e Montana 44: 273-290.

Claussen, G. 1989. Schwarzwildschaeden im Gruenland: ein problem, das man in den griff bekommen kann. Wild und Hund 26: 8-10.

Dardaillon, M. 1989. Age-class influences on feeding choices of free-ranging wild boars (*Sus scrofa*). Canadian Journal of Zoology 67: 2792-2796.

Diet composition and diversity in juvenile, yearling, and adult pigs were studied in the Parc Naturel Regional de Camarque by examining amounts of the 7 most common food taxa consumed by each group. Diversity of foods consumed was highest in adults, followed by juveniles.

Dzieciolowski, R., and C. Clarke. 1989. Age structure and sex ratio in a population of harvested feral pigs in New Zealand. Acta Theriologica 34: 525-536.

This study assessed the effects of hunting on the age structure and sex ratio of feral pigs in the northern part of South Island, New Zealand. The age structure of 1,966 harvested pigs was determined by tooth replacement, wear, and cementum annuli in molars. The youngest age group was most affected by hunting. In fact, pigs less than 1 year of age accounting for 70% of the harvest. Thirteen percent of harvested pigs were 1-2 years of age, while 18% were over 2 years of age. The sex ratio of harvested pigs was 1 male to 0.7 females.

Hone, J., and C. Stone. 1989. A comparison and evaluation of feral pig management in two national parks. Wildlife Society Bulletin 17: 419-425.

In Namadgi National Park (NNP) in Australia, feral pigs caused an increase in shrubs and a loss of herbaceous plant species. In Hawaii Volcanoes National Parks (HAVO), the pigs affected plant species composition and diversity. Park managers used different methods to handle these problems. In NNP, the pig population was reduced by poisoning with warfarin. Although this method successfully reduced the pig population, rooting damage remained high. In HAVO, the goal was to eradicate pigs from the area through exclusion fencing, hunting, snaring, and trapping. Through use of these techniques, pigs were successfully eradicated in three of the management areas in HAVO and populations were reduced in other areas.

Koeglsperger, P., and O. Klussmann. 1989. Untersuchungen an einem schwarzwildbestand in der ostheide, raum kaiserwinkel. Diplomarbeit Fachhochschule Hildesheim/Holzminden, Fachbereich Forstwirtschaft.

Lipscomb, D. 1989. Impacts of feral hogs on longleaf pine regeneration. Southern Journal of Applied Forestry 13: 177-181.

Feral pig depredation significantly reduced longleaf pine seedling establishment in regeneration areas, reducing pine seedling density from 500 per acre in fenced areas to 8 per acre in unfenced areas. The results from this study suggest that if large populations of feral hogs were to remain uncontrolled in areas with longleaf pine seedlings, crop failure could result. Methods to control hogs may be needed to protect longleaf pine regeneration in areas containing hogs.

Luechtefeld, F. 1989. Vertreitung und siedluingsdichte des schwarzwildes in der Bundesrepublik Deutschland nach den Abschussergebnissen. Teil 3: Region Nordrhein-Westfalen. Diplomarbeit Fachhochschule Hildesheim/ Holsminden.

McIlroy, J. 1989. Aspects of the ecology of feral pigs (*Sus scrofa*) in the Murchison area, New Zealand. New Zealand Journal of Ecology 12: 11-22.

McIlroy, J., M. Braysher, and G. Saunders. 1989. Effectiveness of a warfarin-poisoning campaign against feral pigs, *Sus scrofa*, in Namadgi National Park, A.C.T. Wildlife Research 16: 195-202.

McIlroy, J., and R. Saillard. 1989. The effect of hunting with dogs on the numbers and movements of feral pigs, *Sus scrofa*, and the subsequent success of poisoning exercises in Namadgi National Park, ACT. Wildlife Research 16: 353-363.

Meynhardt, H. 1989. Hege und bejagung. Schwarzwild-Bibliothek band; 3, Verlag J. Neumann-Neudamm.

Meynhardt, H. 1989. Das rivier. Schwarzwild-Bibliothek band; 2, Verlag J. Neumann-Neudamm.

Mussa, P., and M. Debernardi. 1989. Research on damages caused by wild boars (*Sus scrofa)* in piedmont and proposal of intervention. Ann. Fac. Med. Vet. Torino 33: 281-290.

Pikula, J., and M. Beklova. 1989. Periodic fluctuations in population level of game animals. Ceskoslovenska Akademie Ved. Ustav v. Brne. Prirodovedne Prace 22: 1-46.

Ronchi, B., and N. Miraglia. 1989. I Danni degli animali selvatici nei boschi: descrizione, metodi di stiman, sistemi di prevenzione. Monti e Boschi 40: 45-48.

Saunders, G. 1989. Evaluation of feral pig management strategies in NSW, Australia. Transactions of the Congress of the International Union of Game Biologists 19: 337-339.

Spitz, F. 1989. Wild boar (*Sus scrofa)* mortality and dispersal in the Camargue. Gibier Faune Sauvage 6: 27-42.

Stubbe, C., Mehiltz, S. et al. 1989. Lebensraumnutzung und populationsumsatz des schwarzwildes in der DDR – Ergebnisse der wildmarkierung. Beitraege zur Jagd – und Wildforschung 16: 212-231.

1988

Apllonio, M., E. Randi, and S. Toso. 1988. The systematics of the wild boar (*Sus scrofa*) in Italy. Bollettino di Zoologia 55: 213-221.

Barrett, R., B. Goatcher, P. Gogan, and E. Fitzhugh. 1988. Removing feral pigs from Annadel State Park. Transactions of the Western Section of the Wildlife Society 24: 47-52.

Blasetti, A., L. Boitani, M. C. Riviello, and E. Visalberghi. 1988. Activity budgets and use of enclosed space by wild boars (*Sus scrofa*) in captivity. Zoo Biology 7: 69-79.

Brooks, J., E. Ahmad, and I. Hussain. 1988. Characteristics of damage by vertebrate pests to groundnuts in Pakistan. Vertebrate Pest Conference 13: 129-133.

In Pakistan, vertebrate pest damage to groundnuts starts in mid-July and continues until harvest 3 months later. When wild boars feed on ground nuts, they eat the entire nut. They seem to be drawn to the nuts early in the season before the shells harden. Some plants have only the nuts eaten off but are otherwise unharmed. However, rooting by boars feeding on groundnut crops also causes root exposure, withering, and death in some plants. This damage causes problems for farmers who must devote a considerable amount of time and resources to dealing with hog problems each year before they are able to harvest the nuts.

Casanova, P. 1988. Valutazione del carico teorico di cinghiali in alcuni ambienti tipici della Toscana. Italia Forestale e Montana 43: 73-88.

Casanova, P. 1988. Effetti del sovraccarico di daino e di cinghiale in alcuni ambienti Mediterranei: la tenuta di San Rossore, Pisa. Accademia Italiana di Scienze Forestali. Annali 37: 167-185.

Dardaillon, M. 1988. Wild boar social groupings and their seasonal changes in the Camargue, southern France. Zeitschrift fur Saeugetierkunde 53: 22-30.

Drozd, L. 1988. Influence of dispersion of forest complexes on the damage by wild boar in field crops in microregion of central-east Poland. Sylwan 132: 79-84.

Hone, J. 1988. Evaluation of methods for ground survey of feral pigs and their sign. Acta Theriologica 33: 451-465.

Janeau, G., M. Dardaillon, and F. Spitz. 1988. Influence de la mortalite precoce des femelles sur l'organisation sociale du sanglier (*Sus scrofa)*. Cahiers d'Ethologie Applique 8: 429-436.

Jullien, J. M., S. Brandt, and J. Vassant. 1988. L'apport de mais, a points fixes, est-il un moyen efficace de dissuader les sangliers de frequenter les cereales en lait? Office National de la Chasse - Bulletin Mensuel 130: 19-26.

Jullien, J. M., J. Vassant, et al. 1988. Techniques de capture de sangliers. Office National de la Chasse - Bulletin Mensuel 122: 28-35.

Klotz, R. 1988. Konsequenz zahlt sich aus. Schwarzwildhegeringe im Verleich. Jaeger 1/88: 22-29.

Koehalmy, T. 1988. Der schwarzwildbestand und dessen nutzung in Ungarn. Schweizerische Zeitschrift fuer Forstwesen 139: 963-971.

O'Brien, P. 1988. The toxicity of sodium monofluoroacetate (Compound 1080) to captive feral pigs, *Sus scrofa*. Wildlife Research 15: 163-170.

O'Brien, P., and B. Lukins. 1988. Factors influencing the intake of sodium monoflouroacetate (compound 1080) by free ranging feral pigs. Wildlife Research 15: 285-291.

O'Brien, P., B. Lukins, and J. Beck. 1988. Bait type influences the toxicity of sodium monofluoroacetate (compound 1080) to feral pigs. Wildlife Research 15: 451-457.

Pavlov, P. 1988. Health risks to humans and domestic livestock posed by feral pigs (*Sus scrofa)* in North Queensland. Vertebrate Pest Conference 13: 141-144.

Feral pigs in Northern Australia pose a significant health risk to humans because they can carry contagious diseases, which can infect domestic pigs and cattle. For example, helminth parasites are passed to humans through the consumption of uncooked feral pig meat. People, who consume feral pigs, should be sure to properly handle and prepare the meat to avoid the transfer of parasites or other diseases.

Saunders, G. 1988. The ecology and management of feral pigs in NSW. Thesis, Macquarie University, Ryde, Australia.

Saunders, G., and H. Bryant. 1988. The evaluation of a feral pig eradication program during a simulated exotic disease outbreak. Wildlife Research 15: 73-81

Stone, C., and S. Anderson. 1988. Introduced animals in Hawaii's natural areas. Vertebrate Pest Conference 13: 134-140.

The most visible damage in Hawaii's natural areas is caused by introduced ungulates. Feral pigs are present on all the major islands, and the highest populations of these pests inhabit the wetter forested areas. On these islands, pigs dig up forest ground cover consisting of delicate and rare species of plants. This creates disturbed areas that allow for the invasion of exotic weeds.

Vassant, J., J. M. Gaillard, and F. Klein. 1988. Impact de la chasse sur la dynamique des populations de sangliers: premiers resultats. Office National de la Chasse - Bulletin Mensuel 122: 17-20.

1987

Altmann, D. 1987. Social behaviour in connection to defence of the territory and circadian activity in *Sus scrofa*. Transactions of the Congress of the International Union of Game Biologists 18: 4-5 abstract only.

Baber, D. W., and B. E. Coblentz. 1987. Diet, nutrition, and conception in feral pigs on Santa Catalina Island. Journal of Wildlife Management 51: 306-317.

Blasetti, A., L. Boitani, M. C. Riviello, and E. Visalberghi. 1987. A behavioral study on wild boar (*Sus scrofa*) in captivity. Italian Journal of Zoology 21: 176-177.

Coblentz, B. E., and D. W. Baber. 1987. Biology and control of feral pigs on Isla Santiago, Galapagos, Ecuador. Journal of Applied Ecology 24: 403-418.

This study was conducted to 1) determine the population density, home range, and reproductive biology of feral pigs on Isla Santiago, Galapagos, and 2) to develop methods for the elimination of pigs from the island. Feral pigs were shown to have adverse effects on several endemic animal species on the island, but they do not seem to have an impact on the native vegetation. This resistance by the plants may be linked to the fact that the native giant tortoise heavily used these plants in the past, so the plants naturally can withstand herbivory. This study also revealed that feral pigs on the island eat a variety of animals including the eggs and hatchlings of green sea turtles, giant tortoises, and dark-rumped petrels. Trapping and snaring to control pig numbers were shown to be ineffective and costly, while baiting with poison (compound 1080) was successful and cost effective. Shooting was effective but time consuming. Complete eradication of pigs from the island was the most expensive option considered, and it may also be impossible to accomplish.

Conry, P. J. 1987. Ecology of the wild (feral) pig *(Sus scrofa)* on Guam. Guam Division of Aquatics Wildlife Resource, Department of Agriculture Technical Report 7.

Cugnasse, J. M., P. Teillaud, and R. Bon. 1987. Preliminary data on the diurnal activity patterns and composition of wild boar (*Sus scrofa)* groups in the Espinouse mountain range. Gibier Faune Sauvage 4: 267-277.

Dardaillon, M. 1987. Seasonal feeding habits of the wild boar in a Mediterranean wetland, the Camargue (southern France). Acta Theriologica 32: 389-401.

Dardaillon, M., and G. Beugnon. 1987. The influence of some environmental characteristics on the movements of wild boar *Sus scrofa*. Behavioral Biology 12: 82-92.

Ferrario, G. 1987. Present status, trends, and harvest rates of ungulate populations in Lombardy Region (northern Italy). Transactions of the Congress of the International Union of Game Biologists 18:61 abstract only.

Gaillard, J. M., J. Vassant, and F. Klein. 1987. Some characteristics of the population dynamics of wild boar (*Sus scrofa)* in a hunted environment. Gibier Faune Sauvage 4: 31-47.

Garzon-Heydt, P. 1987. Study of a population of wild boar (*Sus scrofa)* in Spain, based on hunting data. Transactions of the Congress of the International Union of Game Biologists 18: 64-65 abstract only.

Hirotani, A., and J. Nakatani. 1987. Grouping patterns and inter-group relationships of Japanese wild boars (*Sus scrofa leucomystax)* in the Rokko Mountain area. Ecological Research 2: 77-84.

Jullien, J. M., J. Vassant, D. Delorme, and S. Brandt. 1987. A very effective technique for capturing groups of wild boar: the drop-net. Gibier Faune Sauvage 4: 203-208.

Kabudi, P., S. Fetter, et al. 1987. Etude du regime alimentaire du sanglier (*Sus scrofa)* dans les Ardennes belges. Cahiers d'Ethologie Appliquee 7: 223-246.

Lloyd, D. S., R. B. Smith, and K. A. Sundberg. 1987. Introduction of European wild boar to Marmot Island, Alaska. Murrelet 68: 57-58.

Macek, D. 1987. Immobilization of some species of big game animals. Transactions of the Congress of the International Union of Game Biologists 18: 108-109 abstract only.

Mansouri, A. 1987. Feral hog fidelity to home range after exposure to supplemental feed. Thesis, Texas A&M University, College Station.

Pavlov, P. M. 1987. Population dynamics of feral pigs in Eastern Australia. Transactions of the Congress of the International Union of Game Biologists 18: 144 abstract only.

Pepin, D., F. Spitz, G. Janeau, and G. Valet. 1987. Dynamics of reproduction and development of weight in the wild boar (*Sus scrofa*) in southwest France. Zeitschrift fur Saugetierkunde 52: 21-30.

Polish Hunting Association. 1987. Seasonal settlement of agricultural landscape by the wild boar. Transactions of the Congress of the International Union of Game Biologists 18: 154 abstract only.

Polish Hunting Association. 1987. The wild boar and plant production in agriculture. Transactions of the Congress of the International Union of Game Biologists 18: 154 abstract only.

Robert, S., J. Doncosse, and A. Dallaire. 1987. Some observations on the role of environment and genetics in behaviour of wild and domestic forms of *Sus scrofa* (European wild boars and domestic pigs). Applied Animal Behaviour Science 17: 253-262.

Male and female pigs were observed to be active approximately the same amount of time. However, wild pigs were observed to be more active than domestic pigs. These activity levels likely are linked to food availability. Because domestic pigs are fed by humans, they do not need to actively search for food. Conversely, wild pigs must find their own food, so they must engage in searching activity. Thus, searching for resources increases the overall activity levels of wild pigs.

Saena de Buruaga, M., L. Costa, and F. J. Purroy. 1987. Distribution and abundance in fall and winter of three wild ungulates in the central range of Cantabrian Mountains (northern Spain). Transactions of the Congress of the International Union of Game Biologists 18: 34 abstract only.

Saez-Royuela, C., and J. L. Telleria. 1987. Reproductive trends of the wild boar (*Sus scrofa)* in Spain. Folia Zoologica 36: 21-25.

Sardin, T., and B. Cargnelutti. 1987. Typology of trees marked by wild boars in a slightly deforested region. Monitore Zoologico Italiano 21: 345-354.

Stone, C. P., and J. O. Keith. 1987. Control of feral ungulates and small mammals in Hawaii's national parks: research and management strategies. Pages 277-288 *in* C.G. J. Richards, and T.Y. Ku, editors. Control of Mammal Pests.

Stubbe, C. 1987. Lebensraumnutzung und populationsumsatz des schwarzwildes in der DDR – Ergebnisse der Wildmarkierung. Unsere Jagd 37: 228-230.

Szukiel, E., and Z. Lewandowski. 1987. Game damage in the forest and field. Prevention methods. Transactions of the Congress of the International Union of Game Biologists 18: 198 abstract only.

Yarrow, G. K. 1987. The potential for interspecific resource competition between white-tailed deer and feral hogs in the post-oak savannah region of Texas. Dissertation, Stephen F. Austin State University, Nacogdoches.

1986

Baber, D. W., and B. E. Coblentz. 1986. Density, home range, habitat use, and reproduction in feral pigs on Santa Catalina, Island. Journal of Mammalogy 67: 512-525.

This study assessed density, home range, habitat use, and reproduction in feral pigs on Santa Catalina Island. During the dry seasons (July-Dec. 1980, and June-Sept. 1981) home ranges were smaller than those during the wet season (Jan.-May 1981). According to radio-telemetry data, home ranges differed significantly among pigs, and the home ranges of boars were larger than those of sows. During the dry season, feral pigs preferred cool moist canyon bottoms due to a physiological need for free water as well as a behavioral response to high temperatures. Flat aspects and lower elevations were used most heavily, while ridge tops and southern aspects were avoided. Dense vegetation was more actively sought after than open areas such as grasslands. Oat hay cultivations also were heavily exploited. During the wet season, habitat use was a function of food availability. Pigs were most active during crepuscular and nocturnal times. The population showed seasonality in the timing of births, with some pigs giving birth in winter and spring and some giving birth in summer and spring. Females are known to have about 5 young every 0.86 years, and some females have two litters per year. In this study, fertility continued to increase with age until it peaked at 2-3 years of age. Most of the sows were older than 1 year, so reproductive potential was high for this population of feral pigs. However, 58% of the piglets died before weaning. Mortality was highest in summer months.

Barrette, C. 1986. Fighting behavior of wild *Sus scrofa*. Journal of Mammalogy 67: 177-179.

Dardaillon, M. 1986. Seasonal variations in habitat selection and spatial distribution of wild boar (*Sus scrofa*) in the Camargue, southern France. Behavioural Processes 13: 251-268.

Drozd, L. 1986. Damage caused by wild boars in the field culture in the macroregion of central eastern Poland. Annales universitatis Mariae Curie-Sklodowska. Sectio EE. Zootechnika, 6: 243-253.

Fruzinski, B. 1986. Erkenntnisstand und massnahmen der wildschadensverhuetung in der VR Polen unter besonderer beruecksichtigung des schwarzwildes. Pages 151-157 *in* IV.

Wissenschaftl. Kolloq. “Wildbiol. & Wildbewirtschaftung”, Karl-Marx- Universitaet, Leipzig.

Korn, T. 1986. Control of feral pigs (*Sus scrofa*) in the Macquarie marshes. Pages 213-222 *in* B. Gilligan, M. Madd, and K. McDonald, editors. Proceedings International Symposium on Wetlands.

Kratochvil, Z., Z. Kux, and J. Pikula. 1986. Age structure and reproduction of a population of *Sus scrofa* in Czechoslovakia. Folia Zoologica 35: 311-324.

Lacki, M. J., and R. A. Lancia. 1986. Effects of wild pigs on beech growth in Great Smoky Mountains National Park. Journal of Wildlife Management 50: 655-659.

Growth of American beech in nine high-elevation gaps was examined to determine the effects of wild pigs on these trees. This study compared the growth of American beech (*Fagus granifolia)* before and after feral pigs inhabited the site. After the pigs arrived beech trees exhibited a significant increase in shoot elongation. This increase may be due to the enhancement of nutrient mobilization in the soils that are disturbed by pigs. These findings suggest that wild pig rooting can be beneficial to beech growth.

O’Brien, P. H., R. E. Kleba, J. A. Beck, and P. J. Baker. 1986. Vomiting by feral pigs after 1080 intoxication: nontarget hazard influence of anti-emetics. Wildlife Society Bulletin 14: 425-432.

Poisoning with sodium monofluoracetate (1080) is the most popular method used to control feral pig numbers. Under experimental conditions, most pigs vomited within 1 to 4 hours after ingesting 1080. Vomiting may result in pigs receiving sublethal doses of the toxin. The survival of these pigs after receiving sublethal doses may result in an aversion to 1080. The use of anti-emetics, such as metoclopramide, thiethylperazine, and prochlorperazine did not suppress vomiting in pigs poisoned by 1080, but the amount of vomit was reduced by increasing anti-emetic doses. This reduction of vomiting amount may increase 1080 retention in poisoned pigs, thus increasing the chance of mortality. The concentration of 1080 in vomit was highest during the first bouts of vomiting, but decreased rapidly in subsequent bouts. This potentially high level of 1080 in feral pig vomit can be hazardous to nontarget species.

O’Brien, P. H., and G. Saunders. 1986. Socio-economic and biological impact of the feral pig in NSW: an overview and alternative management plan. Proceedings Australian Rangeland Society Conference 4: 200-203.

Prien, S., and S. Gaertner. 1986. Erhalung, anbau und pflege masttragender baumarten – beitrag zur wildshadenverhuetung. Beitr. Jagd –u. Wildforsch 14: 162-172.

Saez-Royuela, C., and J. L. Telleria. 1986. The increased population of the wild boar (*Sus scrofa*) in Europe. Mammal Review 16: 97-101.

Shafi, M. M., and A. R. Khokhar. 1986. Some observations on wild boar *(Sus scrofa*) and its control in sugarcane areas of Punjab, Pakistan. Bombay Natural History Society Journal 83: 63-67.

Taylor, D., and C. P. Stone. 1986. Controlling feral pigs in Hawaii Volcanoes National Park. Conference of Scientific Research of National Parks 4: 193 abstract only.

Vassant, J., and D. Breton. 1986. Reduction of damage to wheat fields (*Triticum sativum*) at the milk stage by the wild boar (*Sus scrofa*) a preliminary study of the effects of the distribution of maize (*Zea mays*) in adjoining forests. Gibier Faune Sauvage 3: 83-95.

Wathen, W. G., C. E. Eagar, C. E. Noseworthy, J. D. Peine, and P. S. White. 1986. The wild hog research program in Great Smoky Mountain National Park. Conference of Scientific Research of National Parks 4: 196 abstract only.

1985

Baber, D. W. 1985. Ecology of feral pigs on Santa Catalina Island. Dissertation, Oregon State University, Corvallis.

Bouldoire, J. L. 1985. Le statut du sanglier en France-evolution entre 1975-1982. Office Natinoal de la Chasse – Bulletin Mensuel 96: 31-38.

Brown, L. N. 1985. Elimination of a small feral swine population in an urbanizing section of central Florida. Florida Scientist 48: 120-123.

Cargnelutti, B., and T. Sardin. 1985. Study of tree rubbing pattern of *Sus scrofa* in an area of France. Transactions of the Congress of the International Union of Game Biologists 17: 949-951.

Dardaillon, M. 1985. Seasonal habitat selection by wild boars (*Sus scrofa)* in the Camargue, southern France, as rated by signs distributions analysis. Transactions of the Congress of the International Union of Game Biologists 17: 245-253.

French, J. R. 1985. Oak mast availability and use by large mammals in eastern Tennessee. Thesis, University of Georgia, Athens.

Genard, M., and F. Lescourret. 1985. Predation and dispersion of seeds by the wild boar (*Sus scrofa scrofa)* in France. Terre et Vie 40: 343-353.

Ginter, F. 1985. Recommendation of a two-year cycle in wild boar management. Folia Venatoria 15: 219-229.

Hell, P., and J. Salko. 1985. Optimization of the age and structure in wild boar management. Folia Venatoria 15: 205-217.

Hone, J., H. Bryant, P. Nicholls, W. Atkinson, and R. Kleba. 1985. The acceptance of dyed grain by feral pigs and birds. III. Comparison of intakes of dyed and undyed grains by feral pigs and birds in pig proof paddocks. Wildlife Research 12: 447-454.

Kleba, R., J. Hone, and G. Robards. 1985. The acceptance of dyed grain by feral pigs and birds II. Penned feral pigs. Wildlife Research 12: 51-55.

Kristiansson, H. 1985. Crop damage by wild boars in central Sweden. Transactions of the Congress of the International Union of Game Biologists 17: 605-609.

Lescourret, F., and M. Genard. 1985. Search for feeding signs and study of summer habitat use by the European wild boar (*Sus scrofa scrofa)* in the Herault department (France). Gibier Faune Sauvage 1: 63-73.

Mauget, R., and D. Pepin. 1985. Puberty in *Sus scrofa*: preliminary study on the role of food. Transactions of the Congress of the International Union of Game Biologists 17: 191-197.

McIlroy, J. C. 1985. Observations on the sensitivity of some Australian birds and the feral pigs to the organophosphorus insecticide, fenthion ethyl. Wildlife Research 12: 331-335.

Meynhardt, H. 1985. Frischlingsmarkierung und territoriales Verhalten. Wild und Hund 11: 46-49.

O'Brien, P. H. 1985. The impact of feral pigs on livestock production and recent developments in control. Proceedings of the Australian Society of Animal Production 16: 78-82.

Rathore, A. K. 1985. Use of metacloreamide to prevent 1080- induced emesis in wild pigs. Journal of Wildlife Management 49: 55-56.

Spitz, F., and D. Pepin. 1985. Habitat use of *Sus scrofa* in a large forested area. Transactions of the Congress of the International Union of Game Biologists 17: 953-959.

Spitz, F., and D. Pepin. 1985. Habitat use by *Sus scrofa* in an area of intense agriculture. Transactions of the Congress of the International Union of Game Biologists 17: 241.

Telleria, J. L., and C. Saez-Royuela. 1985. Demographic evolution of the wild boar (*Sus scrofa*) in Spain. Mammalia 49: 195-202.

Vassant, J., and B. Boisaubert. 1985. Bilan des experimentations enterprises en Haute-Merne pur reduire les deg sangliers a l'encontre des cultures agricoles. Office Natinoal de la Chasse – Bulletin Mensuel 96: 25-30.

1984

Aumaitre, A., J. P. Quere, and J. Peiniau. 1984. Effect of environment on winter breeding and prolificacy of the wild sow. Colloques Institu National de la Recherche Agronomique 22: 69-78.

Baettig, M. 1984. Die schwarzwild – jagdstrecke 1983/84 vom Kanton Jura. Jagd Hege 16: 38.

Belden, R. C., and W. B. Frenkenberger. 1984. Sustained yield management studies on wild hogs in Florida. Pages 36-37 *in* Tech control. Wild hogs Great Smoky Mountain National Park; Workshop USDI Res./ Resource Management Rep SER-72.

Boisaubert, B., and F. Klein. 1984. Contribution to the study of the spatial of the wild boar (*Sus scrofa)* by capture-recapture. Colloques Institut National de la Recherche Agronomique 22: 135-150.

Bouldoire, J. L. 1984. Status of the wild boar in France. Evolution during the 1975-1982 period. Colloques Institut National de la Recherche Agronomique 22: 173-186.

Briedermann, L. 1984. Ergebnisse der schwarzwildforschunf. Beitr. Jagd – und Wildforschung 13: 69-74.

Bryant, H., J. Hone, and P. Nicholls. 1984. The acceptance of dyed grain by feral pigs and birds. Wildlife Research 11: 509-516.

Campbell, D. J., and M. R. Rudge. 1984. Vegetation changes induced over ten years by goats and pigs at Ross, Auckland Islands (Subantarctic). New Zealand Journal of Ecology 7: 103-118.

Marked sites at Port Ross, Auckland Islands, were examined after 10 years to measure the changes in vegetation and assess the impacts of feral goats and pigs. *Chionochloa antartica* tussock was eliminated or greatly reduced in areas where goats and pigs occurred together, and tussock was reduced slightly where only pigs occurred. Woody vegetation replaced *Chionochloa* tussock grassland and occupies sites where tussock has been removed. Pig rooting and browsing will continue to reduce lowland *Chionochloa* in their range.

CIC. 1984. Symposium sur le sanglier, Chambord 6-7 July 1984. Proceedings CIC.

Coleman, S. 1984. Control efforts in Great Smoky Mountain National Park since 1978. USDI National Park Services R/ RM RPT Ser 72: 15-20.

Dietrich, U. 1984. Ergebnisse und tendenzen der forschungen am wildschwein *Sus scrofa* in Den Jahren 1975-1983. Saeugetierkundliche Mitteilungen 31: 223-237.

Genov, P. 1984. Food preferences of wild boar with regards to various potato cultivars. Colloques Institut National de la Recherche Agronomique 22: 201-204.

Hofmann, R. R. 1984. 2. Schwarzwild – symposium geissen. Schriften Akwj Justus-Leibig-University. Geissen Sondherh.

Hone, J., and H. Bryant. 1984. An examination of feral pig eradication in a hypothetical outbreak of foot and mouth disease at Newcastle, New South Wales. Proceedings of the International Conference of the Wildlife Disease Association 4: 79-85.

Hone, J., and R. Kleba. 1984. The toxicity and acceptability of warfarin and 1080 poison to penned feral pigs. Wildlife Research 11: 103-111.

Janeau, G., and F. Spitz. 1984. Space and time budget of the wild boar (*Sus scrofa)* in Gresigne forest. Colloques Institut National de la Recherche Agronomique 22: 123-134.

Janeau, G., and F. Spitz. 1984. L'espace chez le sanglier (*Sus scrofa scrofa)* occupation et d'utilisation. Gibier Faune Sauvage 1: 73-89.

Klein, F. 1984. Contribution to the study of growth rate in wild boar (*Sus scrofa*) by capture-recapture. Colloques Institut National de la Recherche Agronomique 22: 57-67.

Koenig, R. 1984. Planung und erfolg der bejagung des schwarzwildes in hegerin. 2. Schwarzwild – symposium Giessen. Geissen Sonderh 2: 87-102.

Lacki, M. J. 1984. The effects of rooting by wild boar on tree growth and nutrient cycling in Great Smoky Mountain National Park. Dissertation, North Carolina State University Raleigh.

Mauget, R. 1984. Activity rhythm and time-budget of the wild boar (*Sus scrofa*). Colloques Institut National de la Recherche Agronomique 22: 79-92.

Mauget, R. 1984. Home range use and its determining factors in the European wild boar (*Sus scrofa*). Fifteenth Congress International de Fauna Cinegetica y Silvestre. Trujillo : 315-329.

Mauget, R., R. Campan, F. Spitz, M. Dardaillon, G. Janeau, and D. Pepin. 1984. Current state of the knowledge of boar biology. Research outlooks. Colloques Institut National de la Recherche Agronomique 22: 15-50.

Mayer II, J. J. 1984. The history, comparative morphology, and current status of wild boar in the United States. Dissertation, University of Connecticut, Storrs.

Meynhardt, H. 1984. Die biologie des schwarzwildes im Jehresrhythmus. 2. Schwarzwild – symposium Giessen. Geissen Sonderh 2: 53-64.

Meynhardt, H. 1984. 10 Jahre unter wildschwainen VIII. Zuwachs. Wild und Hund 18: 58-62.

Meynhardt, H. 1984. 10 Jahre unter wildschweinen IV: geschlechterverhaeltnis beim schwarzwild. Wild und Hund 21: 28-30.

Oliver, W. L. R. 1984. Introduced and feral pigs. Pages 85-126 *in* Feral mammals – problems and potential. IUCN/SSC Caprinae Specialists Group.

Pielowski, Z. 1984. Forschung und praxis in der bewirtschaftung des schwarzwild pollen. 2. Schwarzwild – symposium giessen. Geissen Sonderh 2: 41-52.

Ralph, C. J., and B. D. Maxwell. 1984. Relative effects of human and feral hog disturbance on a wet forest in Hawaii. Biological Conservation 30: 201-303.

Royela, C. S., and J. L. Tellereia. 1984. El jabali (*Sus scrofa)* en castilla la Vieja (Espana). Fifteenth Congress International de Fauna Cinegetica y Silvestre 15: 587-597.

Singer, F. J., W. T. Swank, and E. E. C. Clebsch. 1984. Effects of wild pig rooting in a deciduous forest. Journal of Wildlife Management 48: 464-473.
Wild pigs are highly adaptive, have a high reproductive rate, and are secretive. These attributes have allowed them to occupy both original and introduced ranges. Between April and August, pigs can root as much as 80% of the surface area of a forest floor in search of food. The authors compared heavily rooted areas with undisturbed or lightly rooted areas and found a lack of red-backed voles or short-tailed shrews in the heavily rooted stands. The lack of voles appeared to be due to the destruction of habitat by the disruption of leaf litter and the moving of logs, while the negative response of shrews seemed to be due to an 80% decline in macroinvertebrates. Salamander numbers were not different between the two types of rooted stands. Researchers also found acceleration of decomposition and the loss of soil nutrients, such as nitrogen, in heavily rooted areas. Accelerated leaching of Ca, P, Zn, Cu, and Mg from leaf litter and soil was also found in these areas. Although there was a considerable amount of bare soil on rooted sites, the loam soils of the Appalachians were quite porous, and erosional runoff was not a big factor. The results of this study suggest that, in an area of intensely rooted high elevation deciduous forests, wild pigs have had negative effects on 2 ground dwelling species, vegetation cover, and concentrations of soil nutrients.

Spitz, F. 1984. Demographie du sanglier en Gresigne (Su doest de la France). Symposium International Sanglier, Toulouse, France: 151-157.

Spitz, F., G. Janeau, and G. Valet. 1984. Elements de demographie du sanglier (*Sus scrofa*) dans la region de Gresigne. Acta Oecologica 5: 43-59.

Spitz, F. and D. Pepin, editors. 1984. International boar symposium. Colloques Institut National de la Recherche Agronomique 22.

Stone, C. P., and D. D. Taylor. 1984. Status of feral pig management and research in Hawaii Volcano National Park. Proceedings of the Conference National Science Hawaii Volcanoes National Park 5: 106-117.

Tate, J. 1984. Techniques for controlling wild hogs in Great Smoky Mountain National Park. U.S. National Park Services. R/RM/Ser-72.

Tisdell, C. 1984. Feral pigs threaten native wildlife in Australia. Tiger Paper 11: 13-18.

Trnkova, J. 1984. Contribution to the knowledge of growth of the wild boar, *Sus scrofa* Vertebratologicke Zpravy 1984: 102-106.

Urtasun, I. L. 1984. Sobre le relacion del jabali (*Sus scrofa)* con la agricultura, navarra septrional. Fifteenth Congress International de Fauna Cinegetica y Silvestre 15: 639-645.

Van Vuren, D. 1984. Diurnal activity and habitat use by feral pigs on Santa Cruz Island, California. California Fish and Game 70: 140-144.

Santa Cruz Island, California is 25,000 ha in size, and is of the Mediterranean type climate. Feral pigs have inhabited this island since the 1920s. This study investigated activity patterns and habitat use by feral pigs on Santa Cruz Island. The major factors influencing the activity and distribution of pigs were seasonal changes in temperature and food availability and the availability of escape cover. The milder weather of fall and late winter caused pigs to be more active in the morning and evening, while the short, cool, and often rainy days of winter caused midday activity. Nocturnal activity was most often observed when conditions were warm and dry. The adaptable pigs were able to quickly respond to seasonal changes in temperature and availability of food and water. These changes in the environment influenced pig movement among ridge tops, midslopes, and canyons. Acorns and new growth of grasses and forbs dominated the diets of the feral pigs. These results suggest that the concentration of pigs in areas of abundant food can have lasting effects on the vegetation of the island.

Vassant, J., and B. Boisaubert. 1984. Evaluation of experiments made in Haute-Marne to reduce wild boar damages. Colloques Institut National de la Recherche Agronomique 22: 187-199.

1983

Alexiou, P. N. 1983. Effect of feral pigs (*Sus scrofa*) on subalpine vegetation at Small Gap, ACT. Ecological Society of Australia 12: 135-142.

Birmingham, G. H. 1983. Feral hogs. Pages D41-D45 *in* R. M. Timm editor. Prevention and control of wildlife damage.

Holy, J. 1983. Food ecology of boar from the viewpoint of damage to forestry and agriculture. Folia venatoria 13: 51-63.

Hone, J. 1983. A short-term evaluation of feral pig eradication at Willandra in Western New South Wales. Wildlife Research 10: 269-275.

Hone, J., and B. Atkinson. 1983. Evaluation of fencing to control feral pig movement. Wildlife Research 10: 499-505.

Lacki, M. J., and R. A. Lancia. 1983. Changes in the soil properties of forests rooted by wild boar. Southeastern Association of Fish and Wildlife Agencies 37: 228-236.

McIlroy, J. C. 1983. The sensitivity of Australian animals to 1080 poison v. the sensitivity of feral pigs, *Sus scrofa,* to 1080 and its implications for poisoning campaigns. Wildlife Research 10: 139-148.

Meynhardt, H. 1983. 10 Jahre unter wildschweinen III: rangordnung und rauschzeit. Wild und Hund 18: 53-56.

Schnebel, E. M., and J. G. Griswold. 1983. Agnostic interactions during competition for different resources captive European wild boar (*Sus scrofa*). Applied Animal Ecology 10: 291-300.

Soriguer, R. C. 1983. The grazing effect produced by red deer, fallow deer, wild boar, cattle and rabbits on the herbaceous layer. Donana (Acta Vertebrata) 10: 155-168.

Woodall, P. F. 1983. Distribution and population dynamics of dingoes (*Canis familia)* and feral pigs (*Sus scrofa)* in Queensland, 1945-1976. Journal of Applied Ecology 20: 85-95.

1982

Baber, D. W., and B. E. Coblentz. 1982. Immobilization of feral pigs with a combination of ketamine and xylazine. Journal of Wildlife Management 46: 557-559.

Baettig, M. 1982. Etude du sanglier. Rapport des examens effectues sur 128 sangliers tires pendant la saison de chasse 1980-1981 sur le territoire de la republique et canton du jura. Diana 99: 228-231.

Baron, J. 1982. Effects of feral hogs (*Sus scrofa*) on the vegetation of Horn Island, Mississippi. American Midland Naturalist 107: 202-205.

Horn Island is a barrier island located in the Gulf Islands National Seashore. The results indicated that the disturbances caused by feral hogs did not have a major impact on the vegetation on this island. Seasonal differences in hog rooting seemed to be a reflection of the change in diet during the year due to varying abundance of insects, crabs, and dead fish. Rooting increased in the winter when above-ground food items were not available. The vegetation on Horn Island quickly recovered following disturbances by hogs. In fact, areas disturbed in winter regained their original cover within 6 months to 1 year. This quick recovery may be linked to the fact that disturbance is natural on barrier islands.

Barrett, R. H. 1982. Habitat preferences of feral hogs, deer, and cattle on a Sierra foothill range. Journal of Range Management 35: 342-346.

Barrett, R. H. 1982. Wild pigs. Pages 243-244 *in* D. E. Davis editor. CRC Handbook of Census Methods for Terrestrial Vertebrates.

Bratton, S. P., M. E. Harmon, and P. S. White. 1982. Patterns of European wild boar rooting in the western Great Smoky Mountains. Castanea 47: 230-242.

Erkinaro, E., K. Heikura, E. Lindgren, E. Pulliainen, and S. Sulkava. 1982. Occurrence and spread of the wild boar (*Sus scrofa)* in eastern Fennoscandia. Societa pro Fauna et Flora Fennica Memoranda 58: 39-47.

Fadeev, E. V. 1982. The distribution and the population dynamics of boar on the east-European edge of area. Biologicheskie Nauki 1982: 53-57.

Higashino, P. K., and C. P. Stone. 1982. The fern jungle exclosure in Hawaii Volcanoes National Park: 13 years without feral pigs in a rain forest. Proceedings of the Conference National Science Hawaii Volcanoes National Park 4: 86 abstract only.

Hromas, J. 1982. Relation between the quality of wild boar trophies and environmental conditions in Czechoslovakia. Zeitschrift fur Jagdwissenschaft 28: 3-17.

Johnson, K. G., R. W. Duncan, and M. R. Pelton. 1982. Reproductive biology of European wild hogs in the Great Smoky Mountain National Park. Southeastern Association of Fish and Wildlife Agencies 36: 552-564.

Kilham, L. 1982. Cleaning/ feeding symbioses of common crows with cattle and feral hogs. Journal of Field Ornithology 53: 275-276.

Lacki, M. J., and R. A. Lancia. 1982. Effect of wild boar on tree growth: An alternative hypothesis. U.S. National Park Service Annual Science Research Meeting 8: 19 abstract only.

Pavlov, P. M., and J. Hone. 1982. The behaviour of feral pigs, *Sus scrofa*, in flocks of lambing ewes. Wildlife Research 19: 101-109.

Pulliainen, E. 1982. Wild boar: a new game animal in Finland? Suomen Riista 29: 76-79.

Singer, F. J., W. T. Swank, and E. E. C. Clecbsch. 1982. Some ecosystem responses to European wild boar rooting in a deciduous forest. U.S. National Park Service Resource Management Report R/RM-54.

Sweeney, J. M., and J. R. Sweeney. 1982. Feral hog: *Sus scrofa* (wildlife management, North America). Pages 1099-1113 *in* J. A. Chapman and G. A. Felhamer, editors. Wild mammals of North America: biology, management, and economics.

Tisdell, C. A. 1982. Wild pigs: environmental pest or economic resource? Permagon Press, Australia.

van der Werff, H. 1982. Effects of feral pigs and donkeys on the distribution of selected food plants. Noticias de Galapagos 36: 17-18.

1981

Barrett, R. H., and D. S. Pine. 1981. History and status of wild pigs, *Sus scrofa*, in San Benito county, California. California Fish and Game 67: 105-117.

Crouch, L. C., and J. R. Sweeney. 1981. Habitat utilization by feral hogs at Savannah River Plant, South Carolina. South Carolina Academy of Science Bulletin 43: 77.

Fadeev, E. V. 1981. On the dynamics of the northern border of the area of boar in east Europe. Biologicheskie Nauki 9: 56-64.

Genov, P. 1981. Food composition of wild boar in northeastern and western Poland. Acta Theriologica 26: 185-205.

Genov, P. 1981. The distribution of wild boar (*Sus scrofa)* in Eurasia and its adaptation to the conditions. Zeitschrift fur Jagdwissenschaft 27: 221-231.

Genov, P. 1981. Significance of natural biocenoses and agrocenoses as the source of food for wild boar (*Sus scrofa)*. Ekologia Polska 29: 117-136.

Gorynska, W. 1981. Method of determining relations between the extent of damaged farm crops, big game numbers and environmental conditions. Acta Theriologica 26: 469-481.

Hennig, R. 1981. Schwarzwild. Biologie, verhalten, hege und jagd. BLV-Verlag, Muenchen, Germany.

Howe, T. D., F. J. Singer, and B. B. Ackerman. 1981. Forage relationships of European wild boar invading northern hardwood forest. Journal of Wildlife Management 45: 748-754.

Litvinov, V. P. 1981. The wolf (*Canis lupus)* and wild boar (*Sus scrofa)* in the Kyzyl-Agach State reservation. Zoologicheskii Zhurnal 60: 1588-1591.

Martinez-Rica, J. P. 1981. New Data on the social behaviour of half-free kept wild boar. Publ. Cent. Pirenaico Biol exp. 12: 19-54.

Pavlov, P. M. 1981. Feral pigs – ungulate predators. New Zealand Journal of Ecology 4: 132-133.

The goal of this study was to determine if feral pigs prey on ungulates. Feral pigs were observed attacking and killing lambs on ten occasions in the spring and autumn of 1978 and 1979, and another fifteen lamb deaths also were confirmed pig kills. When within 10 m of the flock, lone pigs would rush the flock, attack the closest lambs and ewes, and kill lambs by biting the thorax.

Pavlov, P. M. 1981. The diet and general ecology of the feral pig (*Sus scrofa)* at Girilambone NSW. Thesis, Monash University, Melbourne, Australia.

Puigdefabregas, J. T. 1981. Notes on rooting of wild boar in forest environment. Publicaciones del Centro Pirenaico de Biologia Experimental 12: 7-17.

Singer, F. J. 1981. Wild pig populations in the national parks. Environmental Management 5: 263-270.

Feral pigs have a diverse diet, allowing them to occupy an incredible range of habitats. They rarely migrate seasonally and range sizes are dependent on food availability. The effect feral pigs have on an area is dependent upon the density of pigs and the relative sensitivity of the natural systems in the area. Impacts are most severe when there is a high density of feral pigs and/or the plant system is sensitive to disturbance. One study, conducted after 8 years of feral pig occupation in a national park, noted a significant reduction in plant cover, an increase in bare ground, and a reduction in litter horizon depth. Soil horizons mixed and decomposition rates increased. Thus, rooted areas were less likely than pristine stands to be occupied by shrews and voles. However, rooting stimulated the sprouting of beech.

Singer, F. J., D. K. Otto, A. R. Tipton, and C. P. Hable. 1981. Home ranges, movements, and habitat use of European wild boar in Tennessee. Journal of Wildlife Management 45: 343-353.

Wiles, G. 1981. Guam wildlife investigations: population size and distribution of wild pigs. Guam Department of Agriculture, Aquatic & Wildlife Resources Division.

1980

Baber, D. W., and J. G. Morris. 1980. Florida scrub jays foraging from feral hogs. Auk 97: 202.

Baettig, M. 1980. Contribution a la biologie et ecologie du sanglier (*Sus scrofa*) dans le canton de Vaud. Conservation de la faune et section protection de la nature sites du canton de Vaud.

Baettig, M. 1980. Das schwarzwild im kanton waadt – siene jagd, verbreitung konflikt mit der landwirtschaft. Schwarzwild – Symposion Giessen. Giessen sonderh 1: 81-101.

Baettig, M. 1980. Wildshwein. Wildbiologie fuer die praxis 1.

Baettig, M., and R. Braunschweiger. 1980. Premiere etude sur les deplacements des sangliers en Suisse. Diana 97: 228-231.

Baron, J. 1980. Vegetation impact by feral hogs: Gulf Islands National Seashore, Mississippi. Proceedings of the Second Conference on Scientific Research in the National Parks 8: 309-318.

At the time of this study, Horn Island, Mississippi had been inhabited by feral hogs for about 140 years. Park personnel had noticed extensive rooting and were concerned about the impact on the dune vegetation. The vegetation types that were hit hardest were wet grassland, dry grassland, and pine savannah, but there were no statistical differences in the damage levels between unrooted and rooted areas. Recovery rates of rooted areas were rapid, and the vegetative cover increased ten-fold. Thus, the researchers concluded that the pigs did not have a significant impact on the vegetation on the island. They felt that because of the island's harsh environment of salt, moving sand, hurricanes, and fire, the disturbance created by pigs was not intense enough to harm the vegetation that can withstand these harsh conditions.

Bratton, S., F. Singer, M. Harmon, and P. White. 1980. Rooting impacts of the European boar on the vegetation of Smoky Mountain National Park during a year of mast failure. Proceedings of the Second Conference on Scientific Research in the National Parks 8: 276-293.

This study was conducted in the Great Smoky Mountain National Park and analyzed the distribution of rooting along elevational and habitat gradient. The author investigated hog diet, rooting activity, and habitat utilization during a year of mast failure. The data showed that wild boar rooting is widespread, affecting a wide variety of communities. The impact of wild boar on different understory species is variable. Mast availability influences the intensity of rooting in different areas.

Diong, C. H. 1980. Responses of feral pigs to trap types and food baits. Proceedings of the Conference National Science Hawaii Volcanoes National Park 3: 91-100.

Heck, L., and G. Raschke. 1980. Die wildsauen. Verlag Paul Parey, Hamburg, Germany.

Hone, J. 1980. Effect of feral pig rooting on introduced and native pasture in northeastern New South Wales. Journal of the Australian Institute of Agricultural Science 46: 130-132.

Results from this study indicate that feral pigs can seriously reduce pasture production by rooting in the soil. Pigs use the pastures during the winter when other foods become scarce. Rooting has a greater effect on native pasture than on introduced pasture, but this may have more to do with grazing than with food preference. Areas in the Eucalyptus forest are in continual states of disruption, thus pig rooting may not be destructive unless the rooting frequency is high.

Hone, J., and H. Pedersen. 1980. Changes in feral pig population after poisoning. Vertebrate Pest Conference 9: 176-182.

Hone, J., and G. W. Robards. 1980. Feral pigs: ecology and control. Wool Technology and Sheepbreeding 28: 7-11.

Huff, M. 1980. Effect of the European wild boar on the woody vegetation on gray beech forest in the Great Smoky Mountains. Proceedings of the Second Conference on Scientific Research in the National Parks 8: 263-275.

Igo, W. K., T. J. Allen, and E. D. Michael. 1980. Observations on European wild boars released in southern Virginia. Southeastern Association of Fish and Wildlife Agencies 33: 313-317.

Jacobi, J.D. 1980. Changes in a native grassland in Haleakala National Park following disturbance by feral pigs. Proceedings of the Second Conference on Scientific Research in the National Parks 8: 294-308.

Katahira, L. 1980. The effects of feral pigs on a montane rain forest in Hawaii National Park. Proceedings of the Conference National Science Hawaii Volcanoes National Park 3: 173-178.

For this study, exclosures were constructed on the floor of a shallow prehistoric pit crator to assess pig damage and vegetation recovery. Extensive pig activity was noted with much of the herbaceous layer severely damaged or absent. A steady increase in cover was evident in all species inside the exclosure. Outside the exclosure, pig damage increased from 40% to 70%. The high pig activity prevented the establishment of new seedlings and exposed tree roots. Pigs greatly reduced the herbaceous layer and the chance for seedlings to become established. Vegetation responded quickly once pigs were removed from the area.

Koenig, R. 1980. Jagdwert und bejagungsrichtlinien beim schwarzwild. Schwarzwild – Symposion Giessen. Giessen sonderh 1: 31-59.

Koenig, R., and R. R. Hofmann. 1980. Schwarzwild – Symposion Giessen, Vom AKWJ Abgehaltene Schwarzwild-Symposions.

Leishman, J. 1980. Effects of feral animals on woody vegetation: Santa Cruz Island, California. Proceedings of the Conference National Science Hawaii Volcanoes National Park 3: 193-228.

Mauget, R. 1980. Home range concept and activity patterns of the European wild boar (*Sus scrofa)* as determined by radio tracking. Pages 725-728 *in* C. J. Amlaner, and D. W. MacDonald, editors. A handbook on biotelemetry and radiotracking.

Mauget, R. 1980. Regulations ecologiques, comportementales et physiologique (Fonction de reproduction) de l'adaptation du sanglier, *Sus scrofa*, au milieu. These, Universite de Tours-Orleans, France.

Morris, J., and D. Poffenberger. 1980. Movements, home range determination and habitat utilization of swine in a subtropical environment. Florida Scientist 43: 28 abstract only.

Pavlov, P. M. 1980. The diet and general ecology of the feral pig (*Sus scrofa)* at Girilambone, NSW. Thesis, Monash University, Melbourne, Australia.

Schauss, M. 1980. Population dynamics and movements of wild pigs in Grant Park. Thesis, San Jose State University, San Jose.

Schneider, E. 1980. Marking an appropriation of food, imitation, and learning in the European wild boar (*Sus scrofa)*. Zeitschrift fuer Jagdwissenschaft 26: 126-132.

Singer, F., and S. Coleman. 1980. Ecology and management of European wild boar in Great Smoky Mountains National Park. Proceedings of the Second Conference on Scientific Research in the National Parks 8: 253-262.

Strand, D. K. and J. D. Morris. 1980. Reproductive ecology and behavior of the Florida feral hog, *Sus scrofa.* Florida Scientist 43: 28 abstract only.

Warshauer, F. R. 1980. An overview of the feral pig problem in Hawaii Volcanoes National Park. Proceedings of the Second Conference on Scientific Research in the National Parks 8: 476-480.

Wood, G. W., and R. E. Brenneman. 1980. Feral hog movements and habitat use in coastal South Carolina. Journal of Wildlife Management 44: 420-427.

In this study, 6 feral hogs (3 boars and 3 sows) in South Carolina were tracked for more than 12 months through the use of collars and harnesses containing radio-transmitters. The average home range used by boars covered 226 ha, while the average home range size for sows was 181 ha. However, pooled t-tests showed no significant difference between the home range sizes of boars and sows. Diel home ranges were also studied. The average diel home range size for boars was 15.5 ha, while for sows it was 16.2 ha. Once again,

statistical tests showed no significant difference between the sexes. Six habitat types were identified, and use of these habitat types by hogs was recorded. During all seasons, the most heavily used habitat types were fresh-water marshes and brackish-water marshes. Radio-collared feral pigs did not use salt marshes. Other types of habitat, such as upland hardwoods, were used based on availability and foraging opportunities.

Wood, G. W., and D. N. Roark. 1980. Food habits of feral hogs in coastal South Carolina. Journal of Wildlife Management 44: 506-511.

The stomach contents of 92 feral pigs were examined over a 12-month period during 1975 and 1976. Fruits, especially acorns, were the most common food type consumed in fall and winter; herbage and foliage were most common in the spring, and roots were most common in the summer. Invertebrates and vertebrates were also a source of food for the feral pigs, although not as important as vegetation. Use of different types of food, such as woody plant roots, may have been underestimated due to eating habits of feral pigs. For example, when pigs eat roots, they chew the root, swallow the sap and starches, and then discard the woody portion. This sap will not be detected in a survey of stomach contents. Impacts of feral hogs on other fauna were mainly the result of competition, especially for the acorn crop. This competition for resources could impact the local deer herd.

1979

Baker, J. K. 1979. The feral pig in Hawaii Volcanoes National Park. Proceedings of the First Conference on Scientific Research in National Parks U.S. National Park 1: 365-367.

Belden, R. C., and W. B. Frankenberger. 1979. A portable root-door hog trap. Southeastern Association of Fish and Wildlife Agencies 31:123-125.

Belden, R. C., and W. B. Frankenberger. 1979. Statewide wildlife research: Brunswick hog study. Florida Game and Freshwater Fish Commission.

Briedermann, L. 1979. Principles and effectiveness of the management of wild boar in the German Democratic Republic. Folia venatoria 9: 241-248.

Foreyt, W. J., and W. C. Glazener. 1979. A modified box trap for capturing feral hogs and white-tail deer. Southwestern Naturalist 24: 377-380.

Hart, K. 1979. Feral pig problems on the South Coast. Agricultural Gazette of New South Wales 90: 18-23.

Feral pigs are a menace to the practice of agriculture in New South Wales. They threaten the livestock industry with to the potential spread of exotic diseases. Feral pigs can act as reservoirs for foot and mouth disease, African swine fever, and trichinosis, all of which can be transferred to domestic livestock, as well as humans. Feral pigs also cause damage to pastures, vegetables crops, and gardens. In areas near the coast, towns are located near forests and swamps. Because of their locations, citizens living in these towns are subject to property damage when pigs dig up lawns, shrubs, and vegetable patches. Additionally, rooting and wallowing by pigs can cause erosion in creek beds. Because of the damage caused by feral pigs in New South Wales, various population control methods have been used in an attempt to decrease pig damage. The three most common population control methods used have been shooting, trapping, and poisoning with compound 1080.

Igo, W. K., T. J. Allen, and E. D. Michael. 1979. Observations on European wild boars released in southern West Virginia. Southeastern Association of Fish and Wildlife Agencies 33: 313-317.

Lindner, A. 1979. Drei jahrzehnte schwarzwildwirtschaft im fuerstl. Forstam thiergarten. Waldhygiene 13: 69-78.

Lyons, R. 1979. Feral pigs wild about new scheme. Agricultural Gazette of New South Wales. 90: 17-19.

Mauget, R. 1979. European wild boars home range as determined by capture-recapture and radiotracking in the Chize Forest. Behavioral Biology 4: 25-42.

Shaffer, M. L. 1979. Behavior of the European wild boar in the Great Smoky Mountains National Park. Proceedings of the First Conference on Scientific Research in National Parks U.S. National Park 1: 357-363.

Smiet, A. C., G. W. Fulk, and S. B. Lathiya. 1979. Wild boar ecology in Thatta district: a preliminary study. Pakistan Journal of Zoology 11: 295-302.

Stahl, D. 1979. Mehr freude am schwarzwild. Die Pirsch 31: 348-353.

Wood, G. W., and R. H. Barrett. 1979. Status of wild pigs in the United States. Wildlife Society Bulletin 7: 237-246.

1978

Aleksij, N. I. 1978. Numbers and management of ungulates in the Soviet Carpathian Mountains. Cong. Theriol. Int. 2: 414 abstract only.

Andrzejewski, R., and W. Jezierski. 1978. Management of a wild boar population and its effects on commercial land. Acta Theriologica 23: 309-333.

Barrett, R. H. 1978. The feral hog on the Dye Creek Ranch, California. Hilgardia 46: 283-355.

Frankenberger, W. B., and R. C. Belden. 1978. Distribution, relative and management needs of feral hogs in Florida. Southeastern Association of Fish and Wildlife Agencies 30: 641-644.

Giffin, J. 1978. Statewide Pittman Robertson program: ecology of the feral pig on the Island of Hawaii. Hawaii Division of Fish and Game.

Henry, V. G., and R. H. Conley. 1978. Survival and mortality in European wild hogs. Southeastern Association of Fish and Wildlife Agencies 32: 93-99.

Iff, U. 1978. Determination de l'age chez le sanglier. Diana 95: 377-381.

Mansfield, T. M. 1978. Wild pig management on a California public hunting area. Cal-Neva Wildlife: Transactions 187-201.

Meynhardt, H. 1978. Schwarzwild – report – vier jahre unter wildschweinen. Verlag Neumann-Neudamm, Melsungen.

Otto, D. K. 1978. Movements, activity patterns, and habitat preferences of European wild boar in Great Smoky Mountains National Park. Thesis, Virginia Polytechnic Institute, Blacksburg.

Otto, D. K. and A. R. Tipton. 1978. An evaluation of a questionnaire-survey technique on the estimate wild boar population in Great Smoky Mountains National Park. Virginia Journal of Science 29: 67 abstract only.

Pavlov, P. M., and J. Hone. 1978. Damage to lambs and crops caused by feral pigs. Australian Vertebrate Pest Control Conference.

Plant, J. W., R. Marchant, T. D. Mitchell, and J. R. Giles. 1978. Neonatal lamb losses due to feral pig predation. Australian Veterinary Journal 54: 426-429.

Feral pigs are widespread in sheep breeding areas and can cause serious losses to lambing flocks. The extent of lamb loss due to feral pig predation is difficult to access because pigs may actively attack the lambs, or they may just scavenge lambs that have died of other causes. This study investigated neonatal lamb losses due to feral pig predation. During the study, no feral pigs were seen killing lambs, and only one was seen eating a lamb. However, the significant difference in lambing performance between an open paddock and one that excluded pigs indicated that feral pigs can have a large impact on the production of sheep.

Timofeeva, E. K. 1978. The behavior of the wild boar at the northern borderline of range. Moskovskogo Obshchestvo Ispytatelej Prirody. Otdel Biologicheskii Byulleten 83: 26-33.

Tipton, A. R. 1978. Determining optimum control strategies for the European wild boar (*Sus scrofa*) in the Great Smoky Mountains National Park using computer simulations. Virginia Journal of Science 28: 68.

Tuercke, F. 1978. Das schwarzwild. Hinweise zur hege bejagung des schwarwildes. DJV, Verlag Dieter Hoffman, Mainz.

Wolf, R. 1978. Trophies of wild boar in relation to total killing in Czechoslovakia. Folia Venatoria 8: 187-202.

1977

Briedermann, L. 1977. Jagmethoden beim schwarzwild und ihre effektivitaet. Beitr. Jagd-U. Wildforsch 10: 139-152.

Jezierski, W. 1977. Longevity and mortality rate in a population of wild boar. Acta Theriologica 22: 337-348.

Kneitz, G., and J. Jaedicke. 1977. Wild boar harvest and distribution in lower Franconia. Waldhygiene 12: 119-122.

Ueckermann, E. 1977. Der schwarzwildabschuss. Verlag Paul Parey, Hamburg, Germany.

Wood, G. W., E. E. Johnson, and R. E. Brenneman. 1977. Observations on the use of succinylcholine chloride to immobilize feral hogs. Journal of Wildlife Management 41: 798-800.

1976

Baettig, M. 1976. Zur biologie und oekologie des wildshweins (*Sus scrofa)* waadt. Diplomarbeit, Univ. Basel.

Belden, R. C., and M. R. Pelton. 1976. Wallows of the European wild hog in the mountains of east Tennessee. Tennessee Academy of Science Journal 51: 91-93.

Dzieciolowski, R. 1976. Estimating ungulate numbers in a forest by track counts. Acta Theriologica 21: 217-222.

Frankenberger, W. B., and R. C. Belden. 1975. Distribution, relative abundance and management needs of feral hogs in Florida. Proceedings of the Southeastern Association of Fish and Wildlife Agencies 30: 641-644.

Howe, T. D. and S. P. Bratton. 1976. Winter rooting activity of the European wild boar in the Great Smoky Mountains National Park. Castanea 41: 256-264.

Rudge, M. R. 1976. A note on the food of feral pigs (*Sus scrofa)* of Auckland. New Zealand Ecological Society Proceedings 23: 83-84.

Wennrich, G. 1976. Eine bemerkung zum kannibalismus bei wildschweinen (*Sus scrofa)* (Kurzmitteilung). Duetsche Tieraerztliche Wochenschrift 83: 68.

1975

Belden, R. C., and M. R. Pelton. 1975. European wild hog rooting in the mountains of east Tennessee. Southeastern Association of Game and Fish Commissioners 29: 665-671.

Bratton, S. P. 1975. The effect of the European wild boar (*Sus scrofa)* on gray beech forest in the Great Smoky Mountains. Ecology 56: 1356-1366.

The author compared vegetation in gray beech forests in the Great Smoky Mountains. In areas where there feral pigs occurred, understory cover was reduced by 50% and there was some loss of plant species diversity. The vegetation that remained in an area after rooting damage by hogs was not adapted to the severe disturbances that occur yearly. The results of this sampling suggest that the recovery of hog damaged understory unlikely as long as the hogs are present.

Challies, C. N. 1975. Feral pigs (*Sus scrofa)* on Auckland Island: status and effects on vegetation and nesting sea birds. New Zealand Journal of Ecology 2: 479-490.

Since their release on Auckland Island in 1807, feral pigs not only have affected the number and distribution of some bird species, but have also modified many plant communities. Pigs feed on large-leaved endemic species on Auckland Island. As a result of this behavior, this vegetation is now limited to inaccessible steep slopes and cliffs. The effects of pigs on birds and their nests is difficult to determine, due to the presence of feral cats that also have a negative effect on these birds. Although population control has been advocated, eradication of feral pigs is impractical. Thus, action was postponed until information assessing the value of control and the most efficient methods of control could be gathered.

Iff, U. 1975. Verhaltensbeibachtungen beim schwarzwild. Feld Wald Wasser 3: 2-5, 8-10.

Jezierski, W., and M. Andrzej. 1975. Food requirements of a wild boar population. Polish Ecological Studies 1: 61-83.

Martin, J. T. 1975. Movement of feral pigs in North Canterbury, New Zealand. Journal of Mammalogy 56: 914-915.

Paslawski, T. 1975. Attempts to reduce damage to fields by forest feeding of black game (*Sus scrofa)*. Beitraege zur Jagd – und Wildforschung 9: 188-194.

Pucek, Z., B. Bobek, L. Labudski, L. Milkowski, K. Andrzej, and T. Andrzej. 1975. Estimates of density and number of ungulates. Polish Ecological Studies 1: 121-135.

Schneider, E. 1975. Mouse in the stomach of wild boar (*Sus scofa)*. Zeitschrift fuer Jagdwissenschaft 21: 190-192.

Scott, C. D., and M. R. Pelton. 1975. Seasonal food habits of the European wild hog in the Great Smoky Mountains National Park. Southeastern Association of Game and Fish Commissioners 29: 585-593.

Springer, M. D. 1975. Food habits of European wild boar X feral hog hybrids on the Gulf Coast. American Society of Mammalogists 55: 19.

Springer, M. D. 1975. Food habits of wild hogs on the Texas Gulf Coast. Thesis, Texas A & M University, College Station.

Timofeeva, E. K. 1975. On the ecology of the boar in the forest-steppe oak grove belgorodsk oblast. Moskovskogo Obshchestvo Ispytatelej Prirody. Otdel Biologicheskii Byulleten 80: 23-24.

1974

Bratton, S. P. 1974. The effect of the European wild boar (*Sus scrofa)* on the high elevation vernal flora in Great Smoky Mountains National Park. Torrey Botanical Society Journal 101: 198-206.

The European wild boar causes damage to the native vernal flora of hardwood forests in the Great Smoky Mountains National Park. Over 50 non-woody species are known to be eaten, uprooted, or trampled by hogs. The hogs in the park seek and eat bulbs of the Turks cap lily, *Lilium superbum*, causing a serious decline in the species. Disturbed species show changes in population structure, favoring plants with deep or toxic roots. Degradation by hogs causes a reduction in herbaceous cover, with areas that have been occupied the longest showing the greatest decline in species.

Ehrmann, J. 1974. Ein beitrag zum helminthenbefall von schweinen aus gross-und kleinbetrieben sowie der wildschweine. Diss. Tieraerstl. Fak. Muenchen, Germany.

Fadeev, E. V. 1974. Population dynamics of *Sus scrofa* in the European part of the Russian SFSR. Zoologicheskii Zhurnal 52: 1214-1219.

Halla, H. 1974. Auch das schwarzwild gehoert dazu. Die Pirsch 26: 270-273.

Hennig, R. 1974. Schwarzwildhege im wirtschaftswald. Waldhygiene 10: 207-212.

Lyubchenko, O. V. 1973. Wild boar in the Voronezh reserve. Moskovkogo Obshchestvo Ispytatelej Prirody. Otdel Biologicheskii Byulleten 78: 17-29.

Snethlage, K. 1974. Das schwarzwild. Verlag Paul Parey, 6. Auflage.

Wacker, F. 1974. Intensitaet der schwarzwild – bejagung in Verschiedene zeiteinheiten Waldhygiene 10: 213-226.

1973

Diong, C. H. 1973. Studies on the Malayan wild pig in Perak and Johore. Malayan Nature Journal 26: 120-151.

Ellisor, J. E. 1973. Chaparral wildlife management area research. Life history of the feral hog in southern Texas. Texas Parks and Wildlife Department.

Fadeev, E. V. 1973. The ecology of the wild boar in the central Russian SFSR. Vestn. Mosk. Univ. Ser. 6 Biol. Pochvoved 28: 20-28.

Giffin, J. G. 1973. Statewide Pittman-Robertson program. Prepare a report on findings and a program for managing feral pig in the rainforests of Hawaii. Hawaii Division of Fish and Game.

Henry, V. G., and G. H. Matschke. 1973. Immobilizing European wild hogs with sernylan. Tennessee Academy of Science Journal 47: 81-84.

Igo, W. K. 1973. Big game investigations. A case history of European wild boar in southern West Virginia. West Virginia Department of Natural Resources.

Pine, D. S., and G. L. Gerdes. 1973. Wild pigs in Monterey County, California. California Fish and Game 59: 126-137.

Scott, C. D. 1973. Seasonal food habits of European wild hogs (*Sus scrofa)* in Great Smoky mountains National Park. Thesis, University of Tennessee, Knoxville.

1972

Belden, R. C. 1972. Rooting and wallowing activities of the European wild hog (*Sus scrofa)* in the mountains of east Tennessee. Thesis, University of Tennessee, Knoxville.

Fox, J. R. 1972. An evaluation of control techniques for European wild hog (*Sus scrofa)* in the Great Smoky Mountain National Park. Thesis, University of Tennessee, Knoxville.

Henry, V. G., and R. H. Conley. 1972. Fall foods of European wild hogs in the Southern Appalachians. Journal of Wildlife Management. 36: 854-860.

Kurz, J. C., and R. L. Marchinton. 1972. Radiotelemetry studies of feral hogs in South Carolina. Journal of Wildlife Management 36: 1240-1248.

1971

Barrett, R. H. 1971. Ecology of the feral hog in Tehama County, California. Dissertation, University of California, Berkeley.

Conley, R. H., V. G. Henry, and G. H. Matschke. 1971. European Hog Research. Tennessee Game and Fish Commission.

Kurz, J. C. 1971. A study of feral hog movements and ecology on the Savanna River Plant, South Carolina. Thesis, University of Georgia, Athens.

1970

Briedermann, L. 1970. The role of *Sus scrofa* in the increase of wildlife productivity through management. Transactions of the Congress of the International Union of Game Biologists 9: 807-811.

Korneyev, A. P. 1970. Fluctuation of the wild boar's numbers in the Ukraine and an optimal density of its population in game areas. Transactions of the Congress of the International Union of Game Biologists 9: 812-814.

Kozlo, P. G. 1970. Factors determining the population dynamics of *Sus scrofa* in Beloveshskyi forest. Zoologicheskii Zhurnal 49: 422-430.

Mackin, R. 1970. Dynamics of damage caused by wild boar to different agricultural crops. Acta Theriologica 15: 447-458.

Rakov, N. V. 1970. Causes of mortality of the wild boar and its interrelation with predators in the Amur Territory. Zoologicheskii Zhurnal 49: 1220-1228.

Sablina, T. B. 1970. On the etiology of boars in broad-leaved woods. Trans. Moscow Soc. Nat. 35: 57-62.

Sweeney, J. M. 1970. Preliminary investigations of a feral hog (*Sus scrofa)* population on the Savannah River Plant, South Carolina. Thesis, University of Georgia Athens.

1969

Henry, V. G. 1969. Detecting the presences of European wild hogs in wild swine populations. Tennessee Academy of Science Journal 44: 103-104.

Matschke, G. H., and V. G. Henry. 1969. Immobilizing European wild hogs with succinylcholine chloride. Journal of Wildlife Management 33: 1039-1041.

Matschke, G. H., and V. G. Henry. 1969. Immobilizing European wild hogs with cap-chur-gem. Southeastern Association of Game and Fish Commissioners 23: 185-188.

1968

Henry, V. G., and G. H. Matschke. 1968. Immobilizing trapped European wild hogs with cap-chur-bar. Tennessee Game and Fish Commission Oct. 32/4/970-972.

1967

Austin, D. H. and J. H. Peoples. 1967. Capturing hogs with alpha-chloralose. Southeastern Association of Game and Fish Commissioners 21: 201-205.

Briedermann, L. 1967. The food-components of wild boar (*Sus scrofa)* in the central European civilized territory. Transactions of the Congress of the International Union of Game Biologists 7: 207-213.

Lawson, A. P. 1967. Ecology of feral goats and feral pigs on Mona Island, Puerto Rico. Thesis, Colorado State University, Fort Collins.

1966

Henry, V. G. 1966. European wild hog hunting season recommendations based on reproductive data. Southeastern Association of Game and Fish Commissioners 20: 139-145.

Matschke, G. H., and J. P. Hardister. 1966. Movements of transplanted European wild boar in North Carolina and Tennessee. Southeastern Association of Game and Fish Commissioners 20: 74-84.

1965

MacGregor, W. G. 1965. Big game investigations. Feral animals in California. California Department of Fish and Game.

Kazlo, P. H. 1965. Data on feeding of *Sus scrofa* in the Beloveshskaya Virgin Forest. Vyestsi Akad. Navul BSSR Syeryya Biyalahichnykh Navuk 2: 90-94.

Zurowski, W., and M. Sakowicz. 1965. Effects of succinylcholine chloride on wild boars. Journal of Wildlife Management 29: 626-629.

1964

Nichols, L. 1964. Wildlife management research. Feral animal survey. Ecology of the wild pig. Hawaii Division of Fish and Game. H.I. W-005-R-15/job 46.

1963

Nichols, L. 1963. Wildlife management research. Ecology of the feral pig. Hawaii Division of Fish and Game H.I. W-005-R-14/job 46.

1962

Matschke, G. H. 1962. Trapping and handling European wild hogs. Southeastern Association Game and Fish Commissioners 16: 21-24.

1961

Haber, A. 1961. The wild pig in Poland. Terre et Vie 108: 74-76.

Papadopol, N. C. 1961. Some new data on the distribution of the wild boar (*Sus scrofa)* in HE Delta. JPRS: 7908.

1959

Dinesman, L. G. 1959. Harm done by ungulate in the Leskhozes of the U.S.S.R. Soobshch. Inst. Les. 13: 5-24.

Jones, P. 1959. The European wild boar in North Carolina. Thesis, University of North Carolina, Chapel Hill.

Sablina, T. B. 1959. Adaptive peculiarities of certain species of ungulates and the influence of these species on changes in vegetation. Soobshch. Int. Lesa Akad. Nauk SSSR 13: 32-43.

Warner, R. E. 1959. Wildlife management research. Ecological investigations on the Hawaiian pig. Hawaii Division of Fish and Game. H.I. W-0050R010/ Job 46.

1958

Presnall, C. C. 1958. The present status of exotic animals in the United States. Journal of Wildlife Management. 22: 45-50.

1954

Steinbacher, G. 1954. Zur biologie eurpaischen wildschweins, *Sus scrofa*. Saeugetierkindliche Mitteilungen 2: 126.

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1975 Bratton
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1979	Mauget
1978	Giffin

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1985	Telleria & Saez-Royuela
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1984 Coleman
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1983 Birmingham
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1981 Barrett & Pine
1980 Hone & Pederson
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1981 Hennig
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1978 Barrett
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1971 Barrett
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1990 Hone (A)
1980 Katahira

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